AUGUST, 1948

Railway Engineering and Maintenance

Heavy freights and fast passenger streamliners subject track to terrific stresses and shocks whether on curves or straightaways. They hammer track night and day.

That's why so many roads use Improved Hipowers to cushion and absorb these shocks, to equalize bolt tensions and to protect rail ends and joint bars.

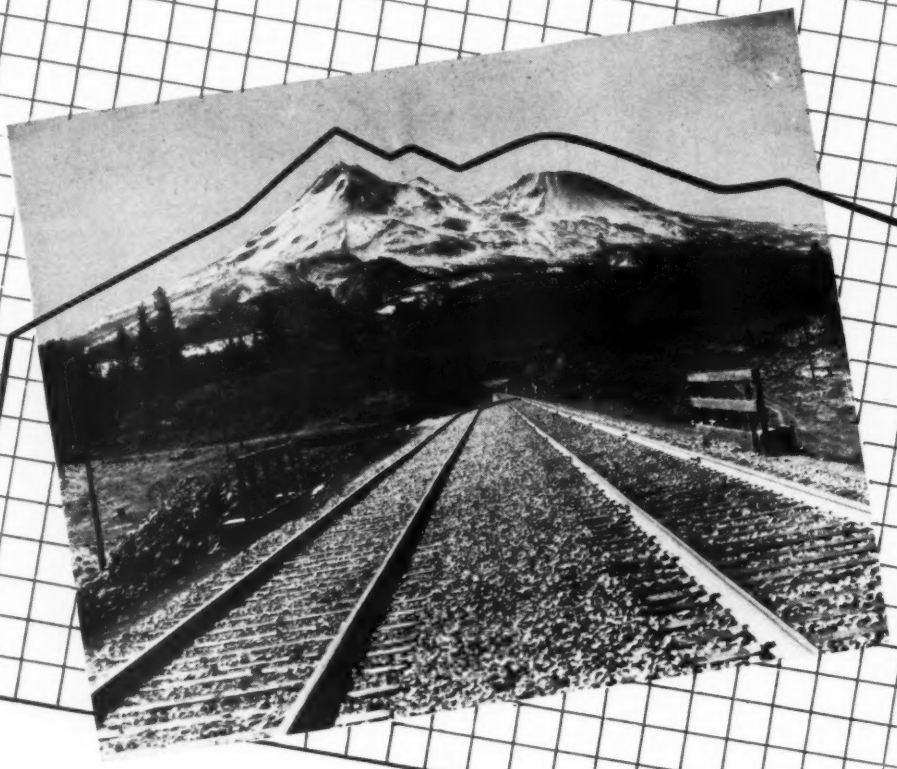
IMPROVED HIPOWERS

IMPROVE TRACK

NATIONAL LOCK WASHER COMPANY, NEWARK, N. J.

A COMPLETE LINE OF RAILWAY SPRING WASHERS

FOR PEAK MAINTENANCE EFFICIENCY



Efficient maintenance improves when Reliance Hy-Pressure Hy-Crome Spring Washers are used on rail joint bolts. Keeping these bolts *tighter longer* reduces rail end batter, extends the time between track joint maintenance and saves money.

Reliance Hy-Pressure Hy-Crome Spring Washers are engineered to maintain adequate bolt tension which compensates for dimensional changes in the rail-joint assembly due to heavier axle loads and high speed rolling stock.

Let Reliance Hy-Pressure Hy-Crome Spring Washers help maintain your track-joint conditions at the peak of efficiency.

Edgemark of Quality

Reliance **HY-PRESSURE HY-CROME** *spring washers*

EATON
EATON MANUFACTURING COMPANY

RELIANCE DIVISION
Offices and plant: MASSILLON, OHIO

Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal

Standard Twin Hook Frog Plates are stocked in 23-, 27-, and 31-in. lengths. Reverse-hook plates, for use at heel ends, are stocked in the 27-in. length.

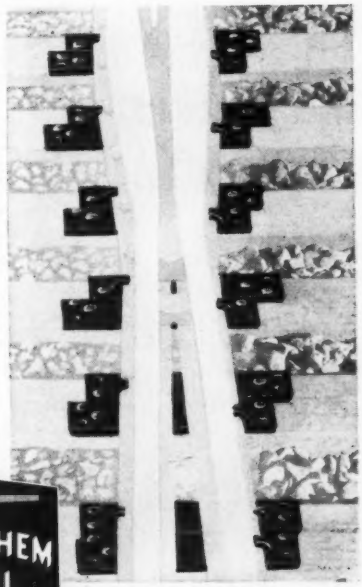
Put 'em to work...they love it

Say "frog"—in the railroad sense—and just like that, you've got a pair of husky twins eager to work for you.

Mighty handy they are, too. They're Bethlehem's Twin Hook Frog Plates, made in pairs, and each equipped with an integral, forged hook that fits snugly over the base of the frog. As the pictures show, this feature enables the plates to be used in several *different* locations under the frog. You don't need a special plate at each tie position.

We said the twins are husky. Just take a glance at the sturdy forged hook in the photograph. It's larger and stronger than an ordinary spike head. Lessens pull on the spikes themselves . . . helps absorb the heaviest thrust. The frog is really *anchored.*

Like to see for yourself? Wherever you are, there's probably an installation near you. Ask a Bethlehem man to point one out.



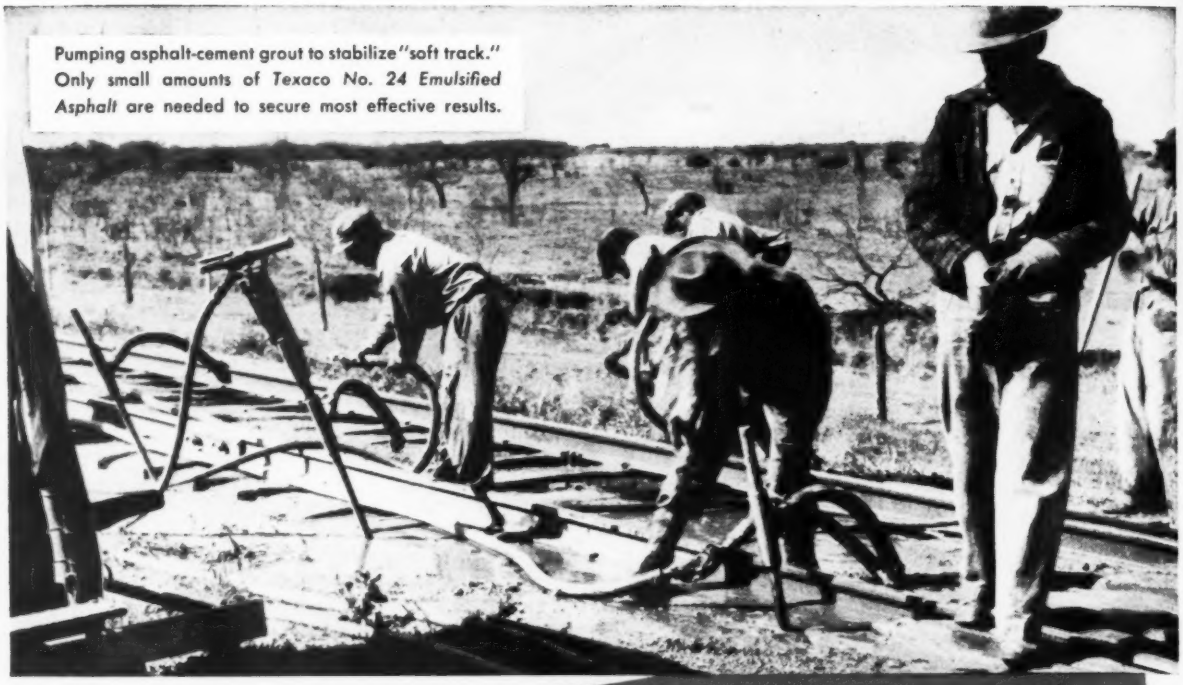
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM TWIN HOOK FROG PLATES

Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $2.00 for one year; $3.00 for two years. Single copies 50 cents. Entered as second-class matter January 20, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., post office. Address communications to 105 W. Adams St., Chicago 3, Ill.



Pumping asphalt-cement grout to stabilize "soft track." Only small amounts of *Texaco No. 24 Emulsified Asphalt* are needed to secure most effective results.

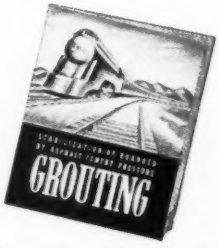
NO MORE "WATER POCKETS"

When you use the Texaco method of asphalt-cement pressure grouting to stabilize "soft track"

WHEN a grouting mixture of sand, cement and a small amount of *Texaco No. 24 Emulsified Asphalt* is pumped into the sub-grade of "soft track" it forces out the water, sets quickly in the voids, and prevents future water accumulation. This means virtually permanent stabilization . . . with worthwhile savings in roadbed maintenance costs continuing over the years.

Texaco No. 24 Emulsified Asphalt is made especially for this use. It helps the grout flow more easily, penetrate and seal better. And the pure asphalt released as the grout sets helps to waterproof the soil and keep it resilient and stable.

For full information on *savings actually achieved* with the Texaco method of asphalt-cement pressure grouting, send for the booklet illustrated, or talk to a Texaco representative. Call the nearest Railway Sales Division Office listed below, or write The Texas Company, *Railway Sales Division,* 135 East 42nd Street, New York 17, N. Y.



SEND FOR this fact-packed 16-page, illustrated book. Describes the development of asphalt-cement pressure grouting, outlines a practical working set-up, shows costs, and benefits secured by a leading railroad.

NEW YORK • CHICAGO • SAN FRANCISCO • ST. PAUL • ST. LOUIS • ATLANTA

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TEXACO Emulsified Asphalt
FOR GROUTING

TUNE IN...TEXACO STAR THEATRE every Wednesday night featuring Gordon MacRae and Evelyn Knight...ABC Network

In the heart of the job—
on America's Leading Railroads . . .

THE leading railroads of the country have proved Northwests on their maintenance-of-way and storeyard jobs. The Northwest Crawler is a real railway man's machine. Its simplicity alone makes it worth considering. The rugged design and construction with its cast steel bases and cast steel machinery side frames, stands up under heavy railway service — keeps shafts in alignment — and reduces wear. Easy operation, the result of the "Feather-Touch" Clutch Control, increases operating safety and keeps the output curve up. Northwest steering and Northwest Crawlers, with their self-cleaning action, takes Northwests where other machines have difficulty and make loading and unloading easier.

You are making long-time plans. The Northwest is the machine for the heart of your maintenance-of-way jobs and you can't afford to have anything but the best in the heart of the job! Plan to have Northwests in those *Key Spots*. Make it the Key Machine and your first Northwest will make you a repeat order buyer.

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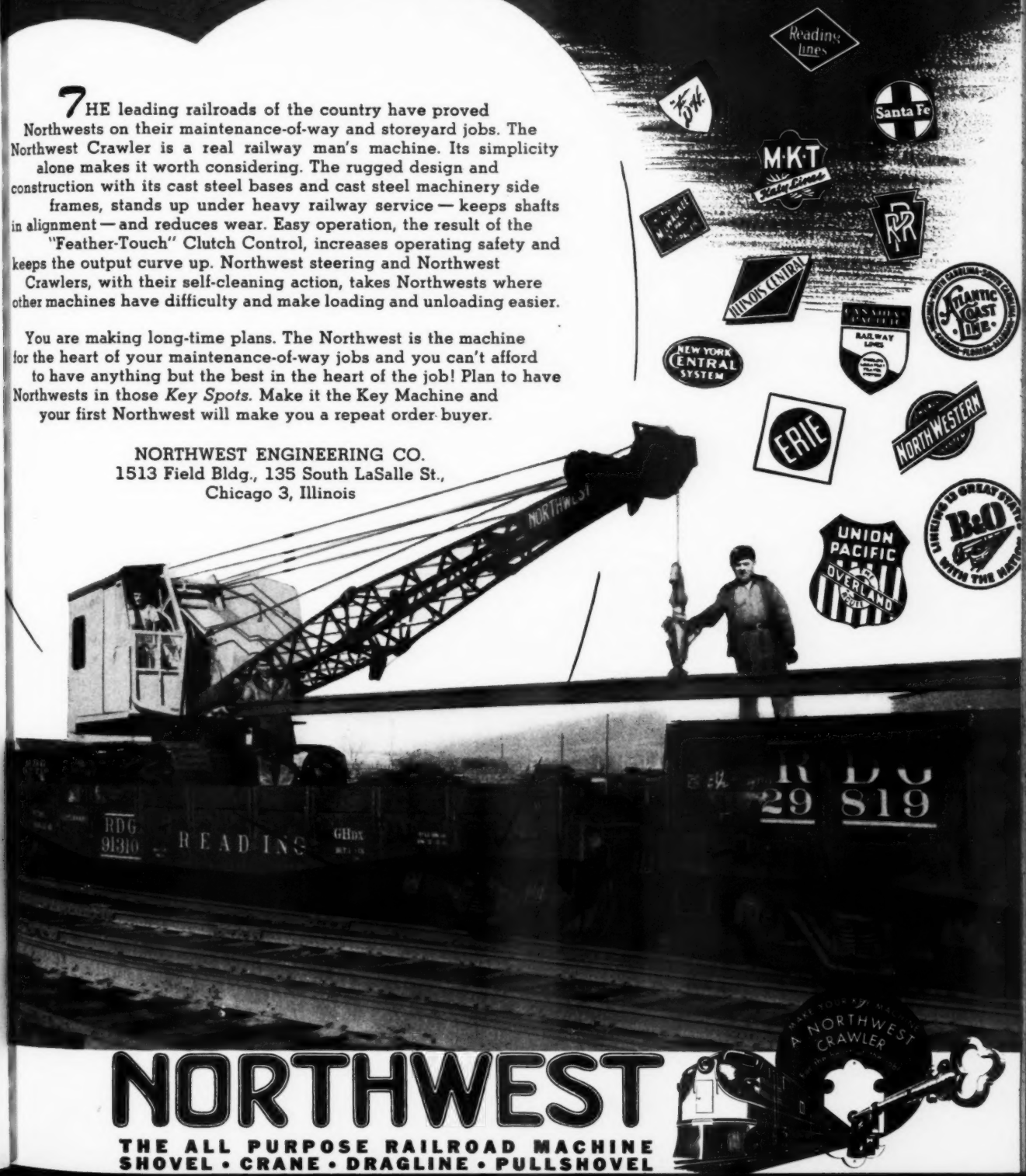

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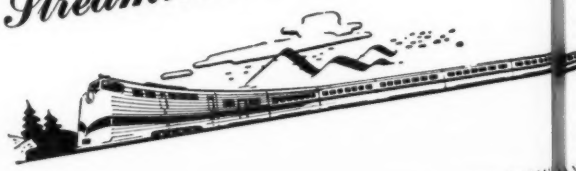
THE ALL PURPOSE RAILROAD MACHINE
SHOVEL • CRANE • DRAGLINE • PULLSHOVEL

PUT MAINTENANCE-OF-WAY *on Streamliner Schedules*



FOR SPOT TAMPING AND TRACK REPAIR WORK

You can operate four CP-3D Tie Tampers, or two CP-116 or CP-117 Spike Drivers, or any combination of tools of equal rating, from a CP Patrol Compressor, with its actual capacity of 60 c.f.m. at 100 pounds pressure.

Easily transported and handled; front and rear retractable dollies facilitate tight-spot, single-rail handling "on track," and give 4-point support "off track." Both engine and compressor are air-cooled — the CP Patrol cannot freeze and is suitable for year-round operation.

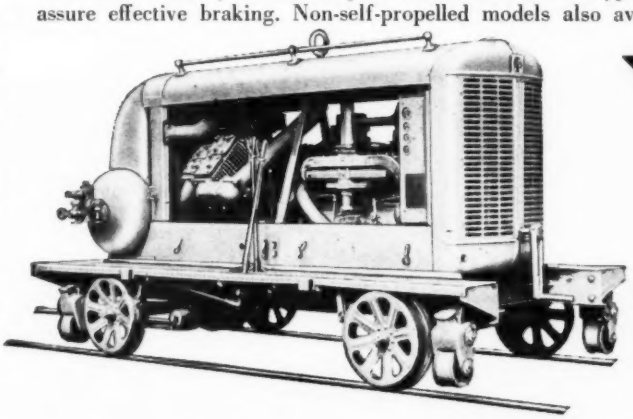
For nipping, small rises, and on jobs where the track is raised several inches, CP-3D Tie Tampers are unequaled.

AMPLE AIR FOR THE BIG TRACK JOBS

CP Flanged-Wheel Mounted Compressors are available in 105, 160, 210, 315 and 500 c.f.m. actual capacity, gasoline or Diesel driven.

Self-propelled models are powered by simple but sturdy air motor — no complicated, troublesome clutches or gears — one lever controls both forward and backward movement. Free wheeling device disengages drive for safe towing at high speeds.

Four hand-operated, "one-man" type, lifting jacks, with transverse wheels, make it easy to shift compressor from tracks. Shoe type brakes assure effective braking. Non-self-propelled models also available.



Keeping pace with the demands of modern railroading, Chicago Pneumatic offers a wide line of time-saving equipment to aid you in improving quality of work on maintenance-of-way jobs.

Write for full information on CP air compressors, also pneumatic and electric tools for railroad use.

SAVES HOURS OF NUT-RUNNING TIME

There's no quicker or easier way to run nuts, and to apply or remove bolts, studs and lag screws, than with a CP Reversible Impact Wrench. Its impacting force is entirely rotary, and is controlled by regulation of air pressure.

No twisting thrust or kick-back . . . minimum vibration lessens operator fatigue. Models from ¼" to 1¾" bolt size.

REMOVES RUST RAPIDLY

Rust, scale or paint can be removed from any metal surface, rapidly and conveniently, with the pneumatically operated CP Wire Brush Machines.

GETS UNDER FROGS AND SWITCHES

Its compact engine design and slender lower end make the CP-5 Gasoline Tie Tamper ideal for use in narrow places . . . permits unobstructed view of work.

Starts quickly by pressure on one of the grip handles. Balance is perfect . . . weight is centered between grip handles. Vibration is minimized by air-cushioning of piston return stroke.

Efficient magneto ignition, eliminating batteries. Standard two-cycle engine operates on gasoline-oil fuel mixture, providing automatic lubrication.

Write for Bulletin SP-1943 — Maintenance-of-Way Equipment

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
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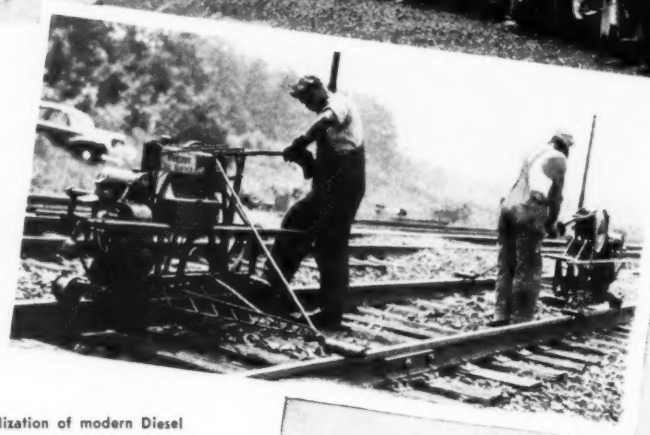
MODERN FREIGHT SERVICE

Demands Modern Track Maintenance

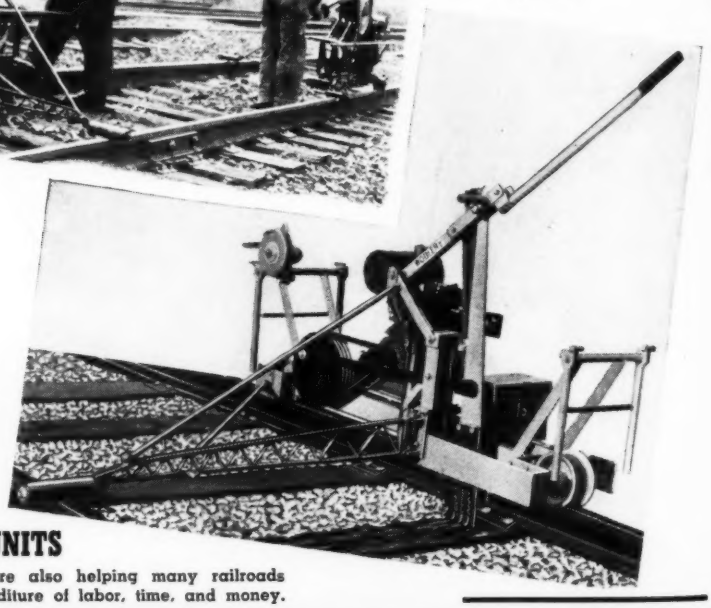
WOOLERY
TIE CUTTERS
like
Diesel Locomotives
meet
Modern Needs



This new improved Model "N" machine, substantially reduced in price, eliminates the old laborious and costly features of tie replacement, works quickly, and without disturbing ballast.

Just as the Great Northern's utilization of modern Diesel locomotives expedites the movement of freight over the Rocky Mountains, so does its use of 54 WOOLERY TIE CUTTERS enable Great Northern track forces to make every minute and every man count for more in removing the hundreds of thousands of crossties that must come out of main and branch lines of this progressive railroad every year.

The WOOLERY TIE CUTTER requires only one man to operate. It saws the tie into three easily-removed pieces, leaving the tie-bed undisturbed, ready to support the new tie. It eliminates trenching and reduces tamping to a minimum. It reduces tie renewal costs as much as 30% and shortens renewal schedules by weeks.



Other WOOLERY MAINTENANCE UNITS

WOOLERY Weed Burners and Creosote Sprayers are also helping many railroads maintain track the modern way, with minimum expenditure of labor, time, and money.

WOOLERY MACHINE COMPANY

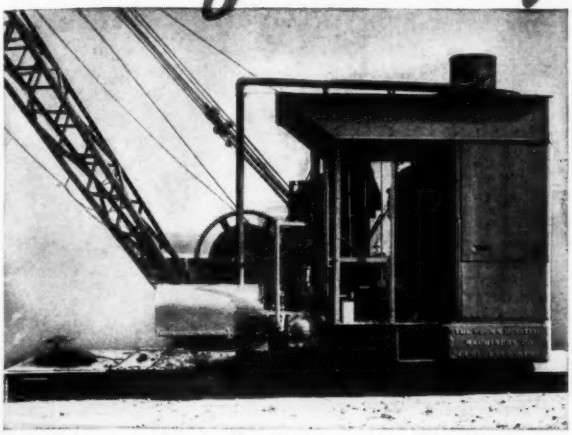
MINNEAPOLIS — Pioneer Manufacturers of — MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

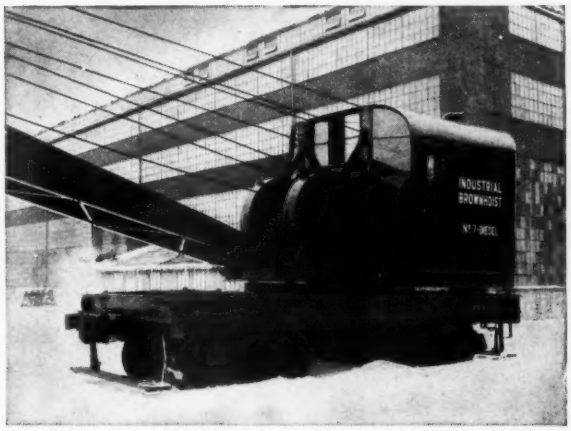
RAILWAY WEED BURNERS • MOTOR CARS • TIE CUTTERS • TIE SCORING MACHINES • RAIL JOINT OILERS • CREOSOTE SPRAYERS • BOLT TIGHTENERS

EXCLUSIVE EXPORT REPRESENTATIVES: PRESSED STEEL CAR COMPANY, INC., PITTSBURGH, PENNA.

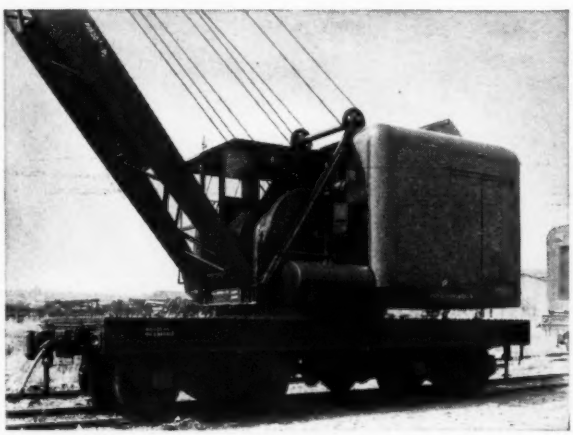
THE *Growth of the Cab* 1907-1948



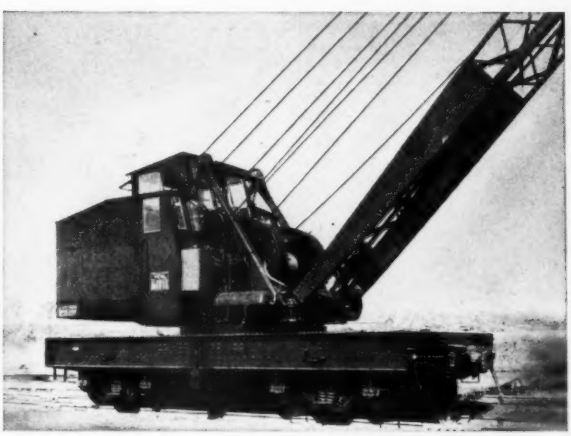
PRIVACY seemed to be the keynote of crane design in 1907. Hardly anyone could see the crane operator, boxed in by cab and caged in by rigging and tools, and *he couldn't see much of anything either.*



BY 1927, glass had caught up with locomotive crane cabs. The Brownhoist trend was to improved visibility, and windows were in vogue. Trouble was, *too much cab was still in the way.*



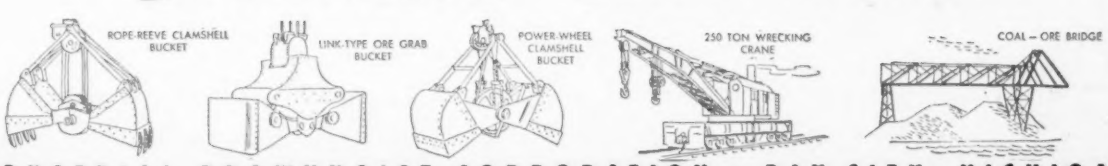
IN 1937, Brownhoist used the side-cab design. It set a new style in crane operation. An *over-the-left-shoulder look* was not only unfashionable—it was impossible.



TODAY, in 1948, Brownhoist has jolted industry by offering the ultimate in sensible, efficient locomotive-crane cab design — the Monitor-type cab that affords the operator 360° visibility.

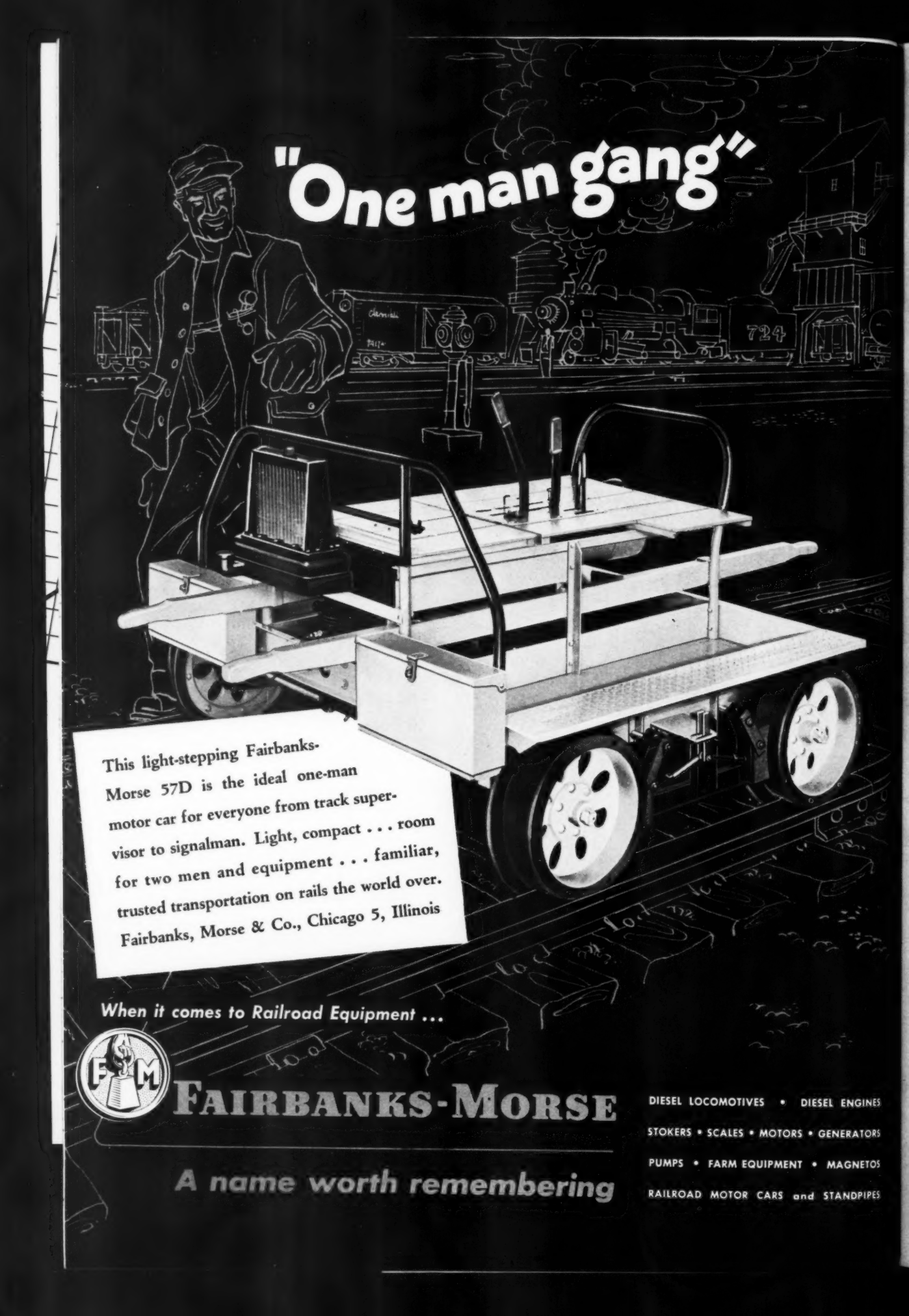
In addition, Brownhoist cranes are equipped with rotating and travel friction disc clutches with one-point adjustment; roller bearings at all essential points; 14" safety clearance between rotating bed and car body; one-piece cast steel bed; and many other important design and construction advantages. *Write for complete particulars.*

Brownhoist BUILDS BETTER CRANES



INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICHIGAN

DISTRICT OFFICES: NEW YORK, PHILADELPHIA, CLEVELAND, CHICAGO • AGENCIES: DETROIT, BIRMINGHAM, HOUSTON, DENVER, LOS ANGELES, SAN FRANCISCO, SEATTLE, VANCOUVER, B. C., WINNIPEG, CANADIAN BROWNHOIST LTD., MONTREAL, QUEBEC.



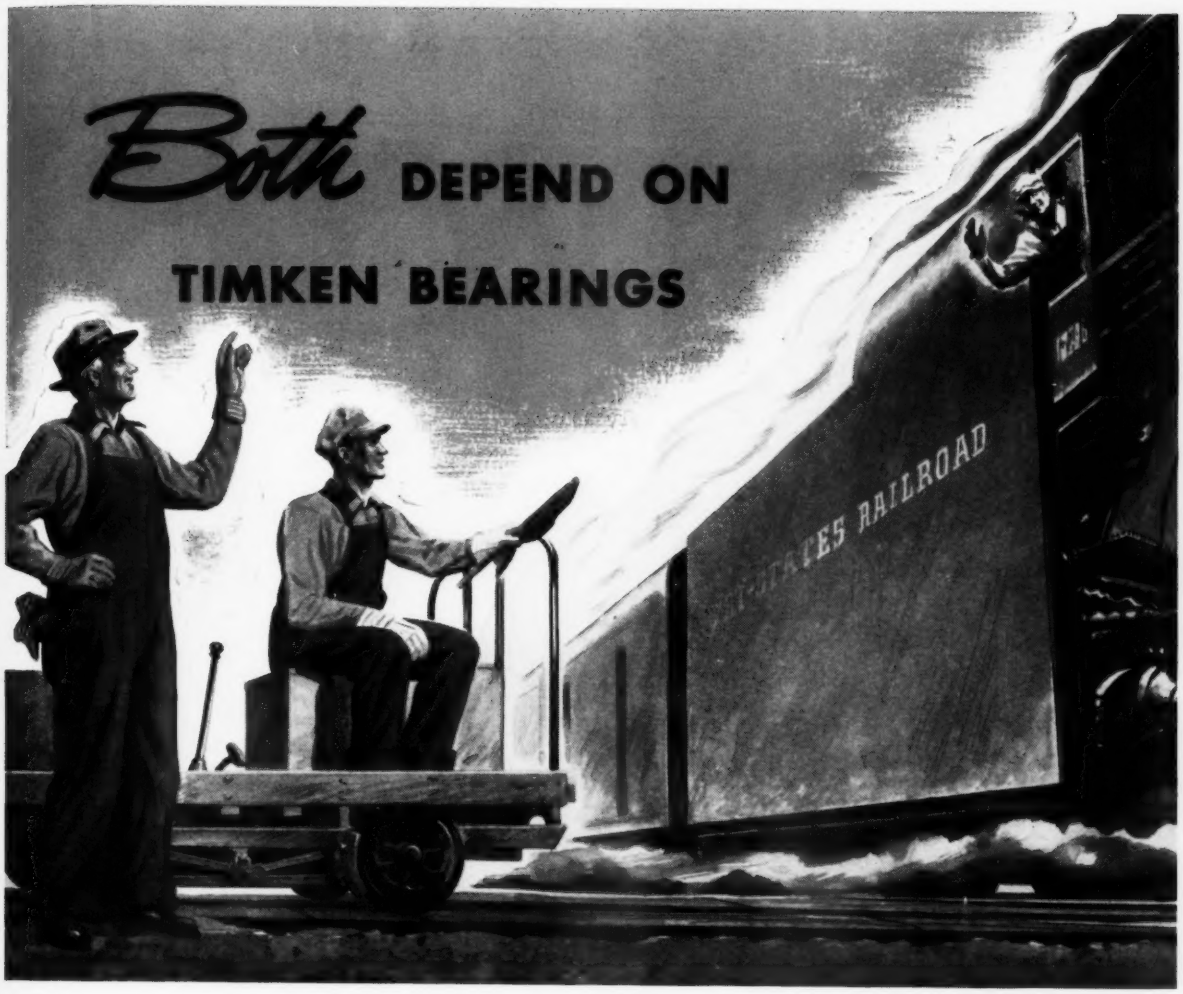
This light-stepping Fairbanks-Morse 57D is the ideal one-man motor car for everyone from track supervisor to signalman. Light, compact . . . room for two men and equipment . . . familiar, trusted transportation on rails the world over.
Fairbanks, Morse & Co., Chicago 5, Illinois

When it comes to Railroad Equipment . . .

FAIRBANKS-MORSE

A name worth remembering

DIESEL LOCOMOTIVES • DIESEL ENGINES
STOKERS • SCALES • MOTORS • GENERATORS
PUMPS • FARM EQUIPMENT • MAGNETOS
RAILROAD MOTOR CARS and STANDPIPES



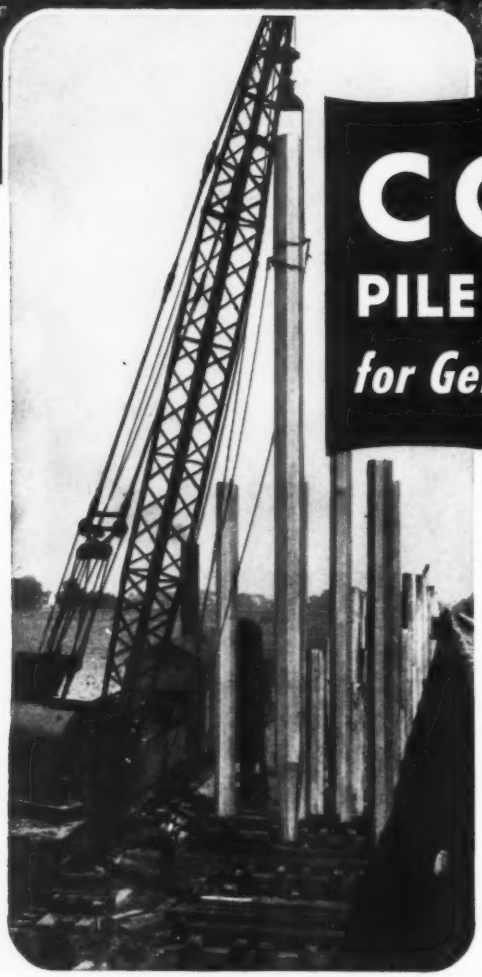
Main line and auxiliary equipment of all kinds using Timken Roller Bearings have these advantages in common: constant availability for service; ability to keep going for maximum periods without shopping; minimum attention for lubrication and maintenance.

American railroads use Timken Bearings in locomotives, passenger cars and streamlined trains to enable them to operate heavier trains on faster schedules.

They use Timken Bearing Equipped section motor cars to help maintain their tracks in sound, safe condition at all times. When buying new section cars of any type it will pay you to ask this question: "Are they equipped with Timken Bearings?" If you are a car builder, look for the trade-mark "TIMKEN" on every bearing you install. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TRADE-MARK REG. U.S. PAT. OFF.
TAPERED ROLLER BEARINGS

48 Years of Engineering and Metallurgical Development



CONCRETE
PILE and SLAB TRESTLES
for Generations of Low Cost Service

When the Louisville & Nashville Railroad decided to replace the old timber trestle at Henderson, Ky., they made a survey to find the most economical type of bridge to build and maintain. Then they chose a reinforced concrete precast pile and slab trestle with a three-pile bent type of construction.

This type, they found, offered the greatest ultimate load-carrying capacity, greater flood resistance, maximum firesafety, lower upkeep and simplicity of construction.

Large precast reinforced concrete piles are preferred for trestles by many American railroads because they (1) give low cost per ton of load capacity, (2) are firesafe, (3) have long life, (4) can be designed to meet a wide variety of climatic, topographic and service conditions, (5) defy termites and other borers.

For help in solving your bridge problems write for a free copy of 80-page booklet, "*Concrete Piles.*" It tells about their design, manufacture and driving. Distributed only in the United States and Canada.

Upper photo: L & N's famous streamliner, the Georgian, crossing the new concrete pile and slab trestle.

Lower photo: Setting one of the 24 in. diameter precast reinforced concrete piles.

The 11,626-ft.-long trestle contains 629 spans. Each bent consists of three piles; every sixth one is an anchor bent with a double row of piles. Concrete piles are 24 in. octagonal design, mostly 50 ft. long.

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A national organization to improve and extend the uses of portland cement and concrete . . . through scientific research and engineering field work

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one 1

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Last year's exhibit embraced the largest number of member companies ever to participate in this combined showing. This year's presentation,—the third annual joint exhibit,—will again be complete in one exhibition hall, running concurrently with and under the same roof as the conventions. It will provide your most convenient opportunity to examine and evaluate the newest and finest in materials and equipment.

two 2

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These two full conventions will feature the customary reports plus special papers and addresses. All railroad men concerned with the maintenance of track and structures will want to gain the full advantage of attending these meetings. Plan now to be present.

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COMPANY..... TYPE OF BUSINESS.....

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17.3
miles per hour

150
horsepower

THIS NEW 16-ton capacity C Tournapull has all the features you've been wanting — 17.3 m.p.h. hauling speed . . . 150 h.p. engine . . . total loaded weight of 61,220 lbs. which gives a weight to power ratio of 408 lbs. per horsepower. In addition, this modern high-speed dirtmover gives you instantaneous speed selection without loss of momentum . . . power proportionating differential for lugging through deep mud, sand and snow . . . positive power steer . . . simplified electric control. This high-speed rig has giant 21.00 x 25 low-pressure tires that roll readily over any surface . . . cross tracks or ride along right-of-way without damage to rails, ties or roadbed. See your LeTourneau Railroad Distributor today for complete facts on this great new C Tournapull. Get your order in now to insure prompt delivery.

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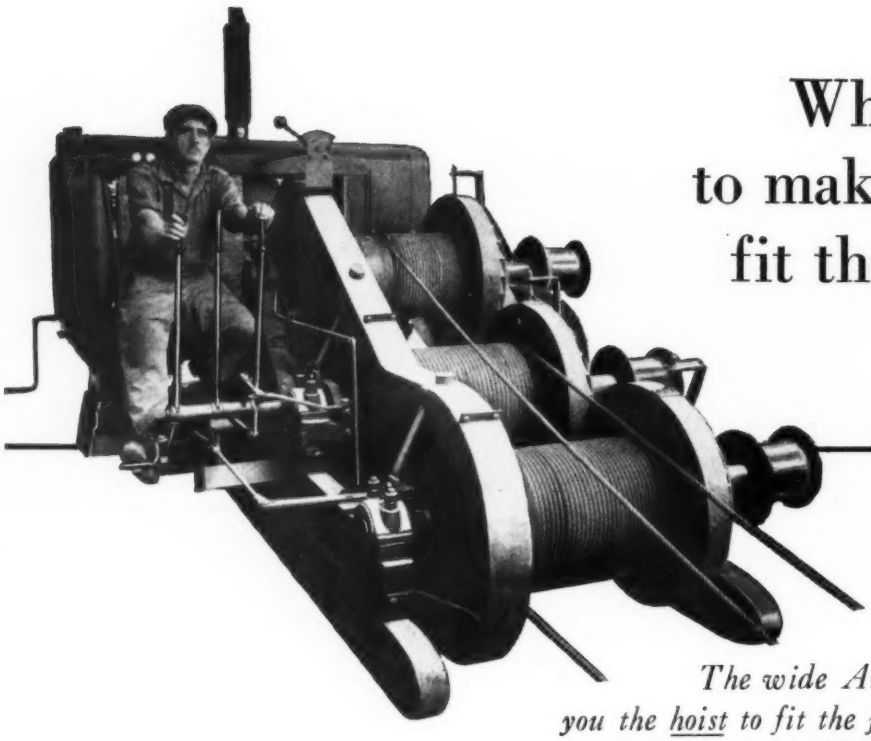
PEORIA, ILLINOIS

HIGH-SPEED RUBBER-TIRED

TOURNAPULLS

MORE YARDS PER HOUR WITH RUBBER-TIRED POWER



Why try to make the job fit the hoist?

The wide American line gives you the hoist to fit the job . . . models ranging from 500 to 40,000 pounds single line pull

During 60 years of hoist building, "AMERICAN HOIST" has constantly expanded its line.

Today we can offer you any desired degree of power, from 500 lbs. to 40,000 lbs. single line pull. From the small roofer's hoists on up to the great Model 400, this line gives you precisely what you need for any job, any set up, any budget. On most sizes, you have your choice of three kinds of power—gasoline, electric or diesel. Steam models are also available.

For the great majority of construction jobs, you'll want one of the five AMERICAN General Purpose Hoists. Capacities are from 2,500 to 10,000 lbs. single line pull. They're light, rugged and speedy . . . easy to use; easy to service.

. . . and DERRICKS to match!

When it's a hoist-and-derrick job, you should have matched units. The "AMERICAN" line meets all derrick needs: Stiffleg, Guy, Gallows Frame, Steel Erector, Barge and special types . . . the most dependable strength you can buy.

Ask your "AMERICAN" distributor, or write us direct, for helpful information on any job.

American Hoist
and DERRICK COMPANY
St. Paul 1, Minnesota

Plant No. 2: SO. KEARNY, N.J.

Sales Offices. NEW YORK • NEW ORLEANS
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that Drives Cut-Spikes FASTER!

Thor PNEUMATIC

SPIKE DRIVER

Maintenance Gang foremen know that they lay more track when their crews are equipped with powerful, easy-handling Thor Pneumatic Spike Drivers. They've seen the results that Thor's extra-long, shorter-travel piston brings through harder blows. A block type, with a "business end" at both ends, the Thor piston is reversible for double life . . . and lower maintenance cost. It is in perfect balance with the cylinder and the Thor automatic valve to provide smooth operation that assures easy handling. Also, because of the shorter travel of both piston and valve, the Thor Spike Driver gets *more work* from all the air—a vital factor where portable compressors are used.

Both light and heavy duty models are available in the Thor line. See your nearby Thor contractors' tool dealer for full details and a free demonstration.

A TOOL OF MANY USES

A quick, simple change in the front head will adapt your Thor No. 25 Spike Driver for breaking concrete and ice, cutting asphalt, digging clay and shale, and many other jobs.

INDEPENDENT PNEUMATIC TOOL COMPANY

Aurora, Illinois

Export Division: 330 West 42nd Street, New York 18, N. Y.

Birmingham · Boston · Buffalo · Chicago · Cincinnati · Cleveland · Denver
Detroit · Houston · Los Angeles · Milwaukee · New York · Philadelphia
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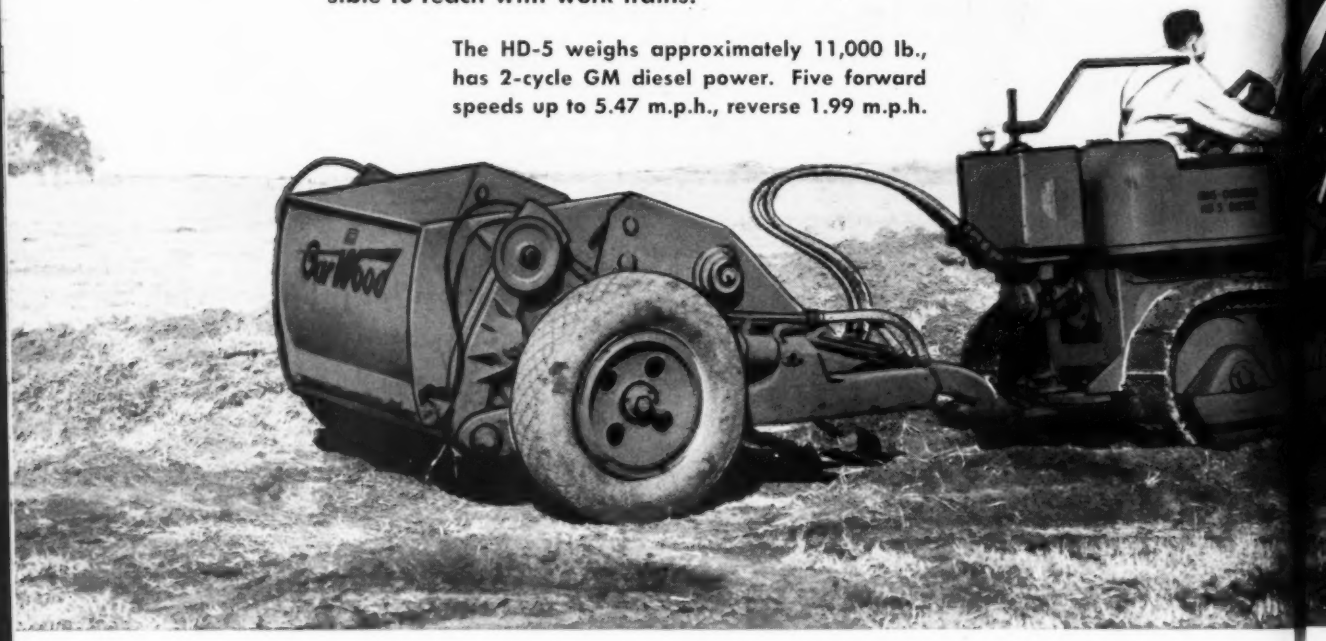
Thor PORTABLE POWER **TOOLS**

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

ONE TRACTOR.

No interruption to either traffic or construction. **This husky Allis-Chalmers HD-5 with Gar Wood scraper and Tracto-Shovel works free of the tracks, moves earth hour after hour without loss of time . . . goes anywhere, handles jobs impossible to reach with work trains.**

The HD-5 weighs approximately 11,000 lb., has 2-cycle GM diesel power. Five forward speeds up to 5.47 m.p.h., reverse 1.99 m.p.h.



THERE IS A RIGHT SIZE AND TYPE ALLIS-CHALMERS

ANY OFF-TRACK CONSTRUCTION AND MAINTENANCE . . . MOWING, HAULING . .

CRAWLER TRACTORS

Allis-Chalmers 2-Cycle Diesel Tractors work with all types of auxiliary equipment on railroad construction or maintenance. Start instantly, operate economically on diesel fuel. Maintain drawbar pull over wide speed range with less gear shifting — spend more time moving dirt. Positive-seal truck wheels and idlers need greasing only once in 1000 hours. Four models — from the 11,000-lb. HD-5 to the world's largest, 40,000-lb. HD-19 which has exclusive torque converter drive.

MOTOR GRADERS

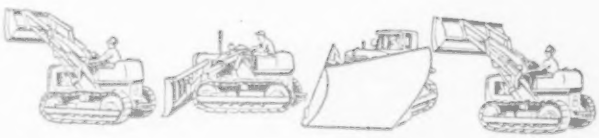
A-C self-propelled motor graders are heavy-duty outfits, with smooth GM 2-cycle diesel power. Have extra clearance, offer a full range of blade positions. Handle bigger loads faster and require less power with "Roll-Away" moldboard. Material is rolled, not pushed. Steering and operation simplified — full visibility, electric gauges, larger clutch. Three models: 104-hp. AD-4; 76-hp. AD-3; 50.5-hp. BD. AD-4 weighs 21,600 lb., BD 17,300 lb.— balanced for fast traction and control.

WHEEL TRACTORS

A-C Wheel Tractors are compact, powerful. Ideal for hauling, mowing, sweeping, bulldozing loose materials. Electric lights and starting. Power take-off and accessories as desired. Kerosene, gasoline or distillate. Five models — 4-wheel and tricycle designs. Model B Mower handles slopes 60° above and 45° below horizontal. Heavy-duty 5-ft. cutter bar is always within full view of operator — quickly raised and lowered by hydraulic lift. Belt drive allows slippage of sickle if bar hits any obstruction.

R...MANY JOBS

An all around, year 'round machine — that's the Allis-Chalmers HD-5 Tractor. Interchangeable Tracto-Shovel attachments make it a . . .



SHOVEL . . .	BULLDOZER . . .	SNOW PLOW . . .	SNOW LOADER
1-yd. standard bucket, tractor width	Heavy-duty 75½-in. and 96-in. blades	All-Purpose V-type	2-yd. special bucket

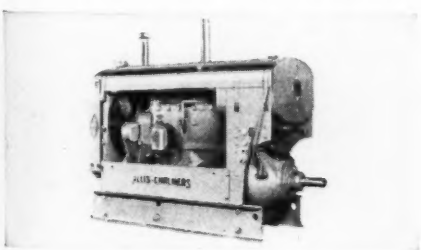
Also with ¾-yd. NARROW BUCKET, ROCK BUCKET and BUCKET TEETH

Here is an ideal outfit for all kinds of railroad work. The HD-5 digs, carries, dumps and spreads — cleans ditches, grades slopes, widens shoulders, backfills. It also plows snow or loads it, clears wrecks, lays or moves track, handles coal and ballast.

HD-5 with Baker Bulldozer is efficient off-track worker. Carco winch (circle) widens usefulness of tractor.

MACHINE FOR . . .

. POWERING TOOLS, etc.



POWER UNITS

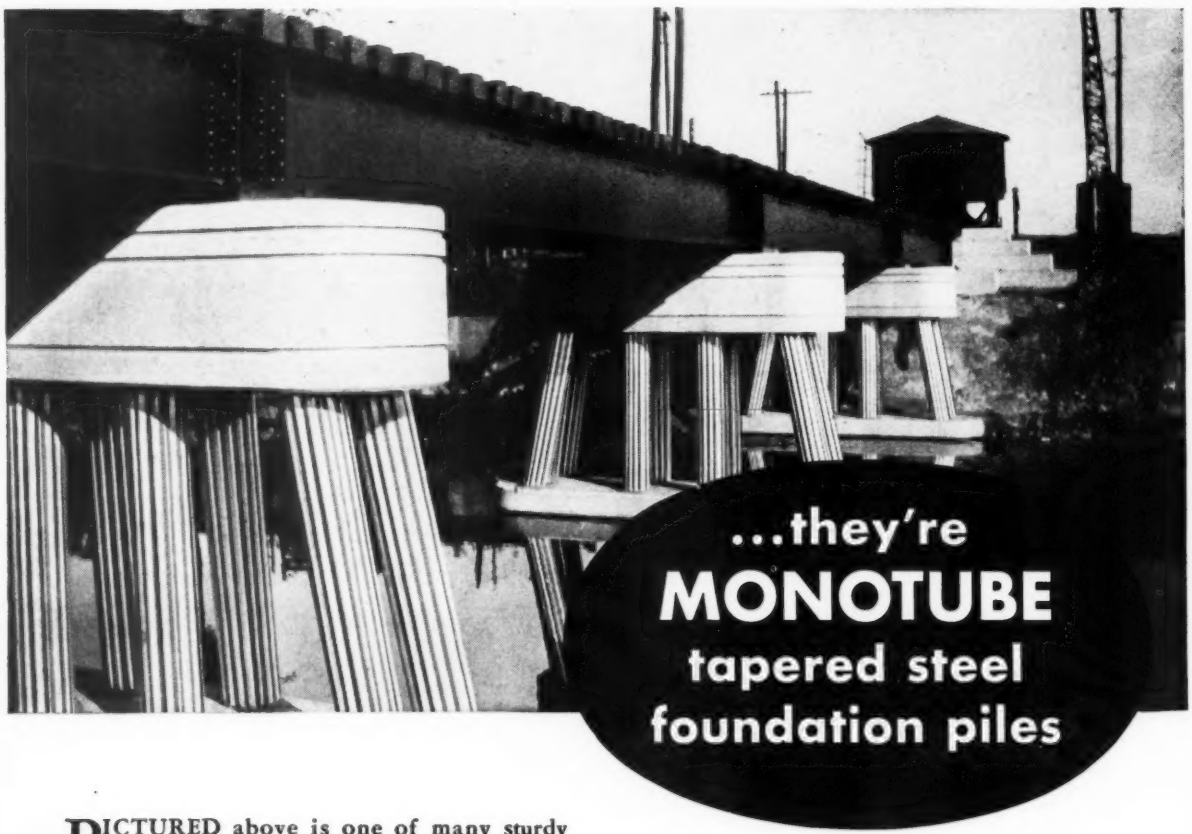
Allis-Chalmers Power Units are high in torque, provide heavy-duty power for pumping, operating air compressors, driving tools — any requirement, steady or intermittent. Mass produced for lowest cost, along with engines by the thousands for tough tractor service. Compact, self-contained, protected from the elements. Accessories to fit application. Nation-wide service facilities. Gasoline, low grade fuel, natural gas, butane. Five models to choose from: 24 to 110 max. b.hp.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U.S.A

Write for complete information, or let us put you in touch with your local Allis-Chalmers dealer.

100-car freights never bother this bridge's "legs"



PICTURED above is one of many sturdy bridges built on Monotube foundations. Structurally strong and durable, it will serve well for years. Heavily-loaded freights will never strain or "bother" the Monotube tapered steel foundation piles.

Monotubes are chosen time and again for foundations. They're preferred by experienced engineers and builders because . . .

Monotubes are light in weight, easily and quickly handled • They are cold-rolled and fluted for extra strength • They are easily extendible, right on the job • Their sturdy construction makes it possible to eliminate use of a driving mandrel • Monotubes' tubular construction makes inspection, before concreting, quick and easy.

Right now you may be planning bridges, buildings, piers, airports, highways. Wherever foundation piling is necessary, plan on Monotubes. They give your projects the right start and a healthy future—make time and cost savings for you. Gauges, sizes and tapers to meet varying soil conditions. For complete information, write The Union Metal Manufacturing Company, Canton 5, Ohio.

UNION METAL
Monotube Foundation Piles

We regret the present extended delivery schedules due to the steel shortage, but you will find Monotube Piles well worth waiting for.

The NEW NO-CREEP RAIL ANCHOR

Designed for Problems of Today and the Track of Tomorrow

1. Maintenance minimized.
2. Engineering allowance made to provide greater strength than needed.
3. No adjustments—
   Cannot get out of adjustment.
4. Low first installation cost.
5. Does not nick rail in event of derailments.
6. Rail Spike is retained in wood—cannot work up.
7. Cannot be abused during installation.
8. Spring can easily be installed or removed with a spike maul.
9. Each installation delivers adequate compression between the tie plate and rail base.
10. UNIVERSAL: This two-way anchor is applicable to any weight of rail or design of tie plate and is JUST AS EFFECTIVE ON RELAID WORN RAIL AS ON NEW RAILS.

Write for Particulars

G & H RAIL CONTROLS, INC.

Phone BE 8117 — **5204 E. 15th St., Bill Glover Bldg.** — **Kansas City 1, Mo.**

PAGE *Welding* ELECTRODES

Welding STAINLESS?

We found out a long time ago that welding stainless steel is not always as simple as it looks. So we set out to study the problems and find the answers.

Since then we have developed the complete line of PAGE-Allegheny Stainless Steel Electrodes and Gas Welding Rods. More important, we have collected—from our Field Service men, our distributors and their customers—a valuable fund of information about welding techniques. We have been able to offer real help to many fabricators of stainless steel.

If you are welding Stainless, we suggest that you . . . . . .

ACCO

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Bridgeport, Conn.

TRADE MARK

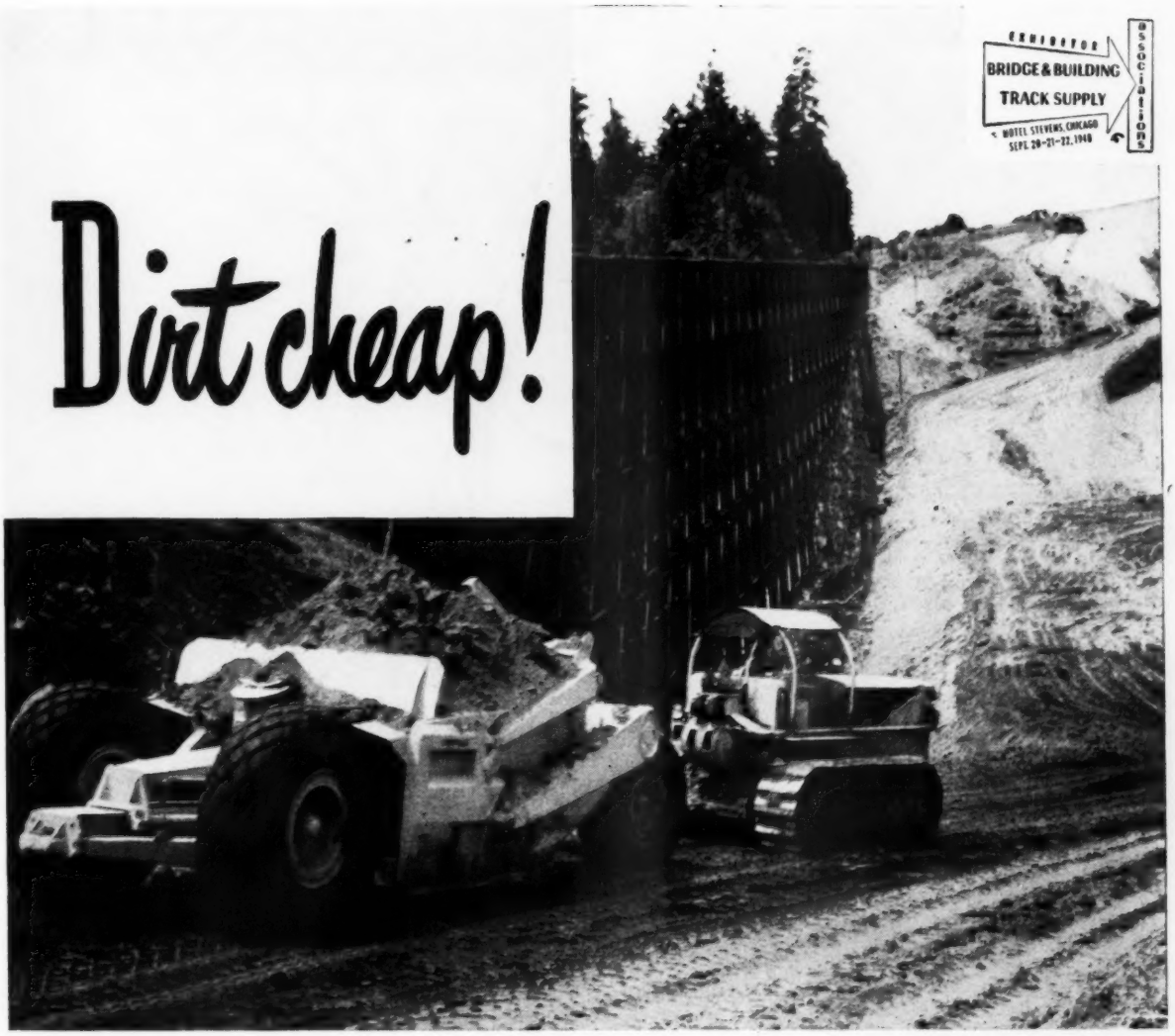
PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

Get in touch with your PAGE Distributor

For additional information, use postcard, pages 839-840

EXHIBITOR
BRIDGE & BUILDING
TRACK SUPPLY
HOTEL STEVENS CHICAGO
SEPT. 20-21-22, 1948
ASSOCIATIONS

Dirt cheap!



Matched equipment . . . a "Caterpillar" D8 Tractor, equipped with "Caterpillar" Cable Control, operating a "Caterpillar" No. 80 Scraper on a 583,000-yard fill replacing a trestle for the Spokane, Seattle and Portland Railway near Cornelius Pass, Oregon.

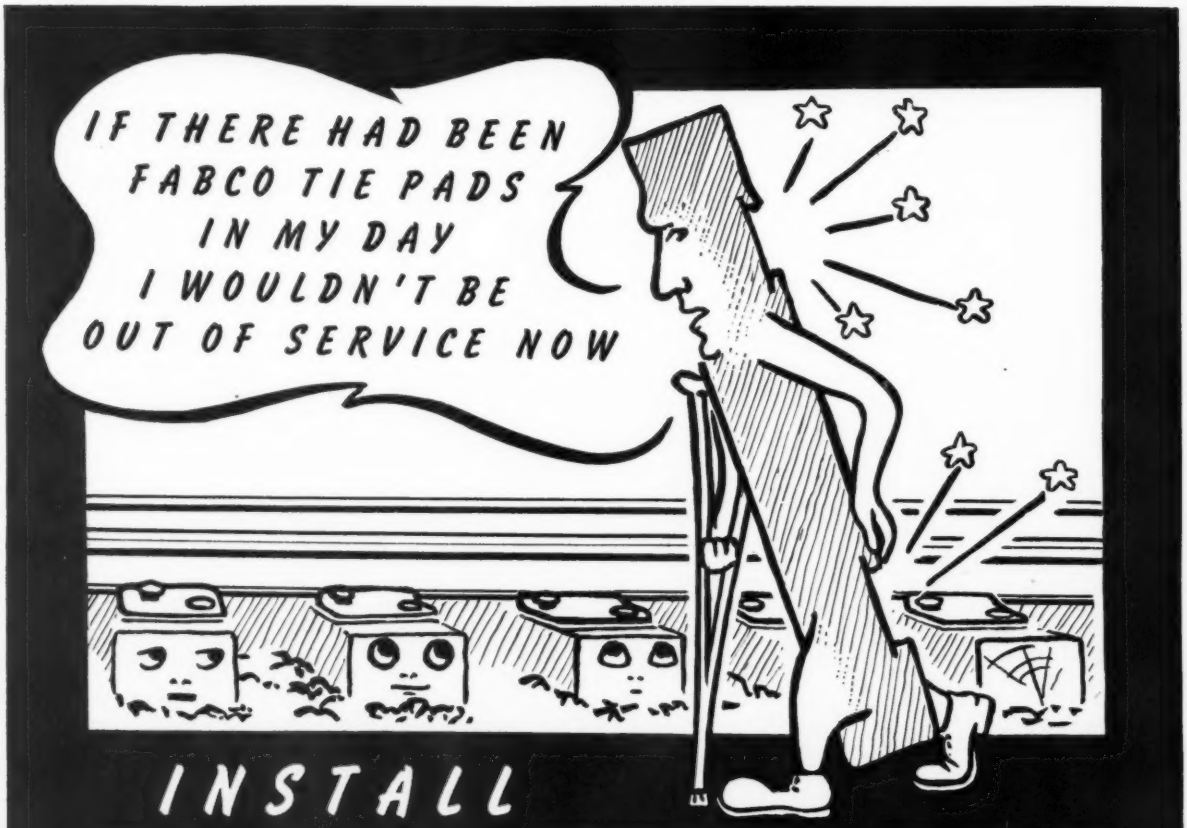
"Lowest costs on earth" through modern "Caterpillar" matched equipment are proving a great boon to railroads! . . . For building roadbed, easing grades and curves, relocating track, reinforcing shoulders, culverts and bridge approaches. . . . For replacing aging, schedule-slowing trestles with solid earth fills—and largely eliminating their further construction of scarce steel or fire-hazardous wood.

The manner, speed and volume with which powerful "Caterpillar" Diesel Tractors and Scrapers can excavate, haul and dump earth—all in one continuous operation—have changed the whole perspective of railroad building, improvement and maintenance. It is the outstandingly *better, quicker, cheaper* way!

Get the whole story from your "Caterpillar" dealer. Note particularly the advantages of "Caterpillar" *matched equipment*—of units specifically designed to work together, built by one manufacturer, and serviced by one efficient and fully equipped dealer organization.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR
REG. U. S. PAT. OFF.
DIESEL ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT



INSTALL FABCO TIE PADS

For Open Track

Seven years of intensive development have produced the new, low cost, FABCO TIE PADS for use in reducing mechanical wear of ties in open track. They withstand extremes of temperature, moisture, brine, mildew, and sand . . . and their limited resiliency, without permanent set makes it unnecessary to drive spikes down a second and third time. Their first cost—also their last cost makes them a real economy to the railroads. Write today for further information of sizes and characteristics of these new FABCO TIE PADS.

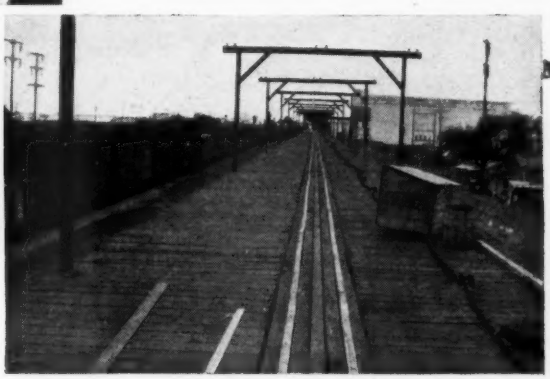
- PREVENTS CUTTING OF TIES
- RESILIENT — NO SET — NO LOOSE SPIKES
- LONG LIFE — NO RENEWALS REQUIRED
- ECONOMICAL

Made By The Makers of Fabreeka

Used in RAILWAY PASSENGER CARS, Trucks and Platforms . . . LOCOMOTIVES, Steam and Diesel Electric . . . TRACK CONSTRUCTION, on Bridges, Crossings, Curves, Turntables and Track Scales.

FABREEKA PRODUCTS COMPANY, INCORPORATED
222M Summer Street
Boston 10, Mass.

Ice loading dock at Harlingen, Texas handles 78 CARS at a time



here...

KOPPERS PRESSURE-CREOSOTED WOOD

puts **SOME MAINTENANCE SAVINGS** *On ice!*

Everyone concerned with icing operations knows the punishment that the docks must take, wear . . . abrasion . . . and intermittent exposure to moisture that sets up ideal incubators for decay.

The designers of the new 1740-foot ice dock at Harlingen, Texas recognized these hazards . . . and adopted a time-tried, time-proven method of combating them. Over 175,000 board feet of Koppers Pressure-treated lumber was used to assure maximum life for the structure, and minimum cost for maintenance.

During the average year, railroads use about 13 million tons of ice in "reefers." Almost every railroad has some share in the problem . . . and some stake in the maintenance of icing docks. In new construction, or in repair work, Koppers Pressure-treated wood can help to put added durability and added economy into the structure.

Koppers operates 21 treating plants, strategically located for prompt, convenient, efficient service to the nation's railroads. Large yards provide ample space for storage and seasoning . . . treating is done in modern equipment, by experienced personnel . . . and half a century of service to the railroads has made us completely familiar with your methods and requirements. Let us quote on your next order.

KOPPERS

PRESSURE-TREATED WOOD

KOPPERS COMPANY, INC.

PITTSBURGH 19, PA.

COMPRESSION

Rail Anchors

Compression two-way holding is an integral part of many important CTC installations. Compression-held rail does not run in either direction—a vital advantage in any remote control installation.

THE RAILS COMPANY

General Office
178 GOFFE STREET, NEW HAVEN 11, CONN.

ST. LOUIS, MO. HOBOKEN, N. J. CHICAGO, ILL.

PUT STATION TRAFFIC on the right road

Where is a station's heaviest traffic? In the baggage rooms . . . the freight depots . . . the loading platforms. They are the real "arteries."

Put that traffic on the right road . . . on heavy duty Mastic Floors made with Flintkote Flooring Emulsion.

This modern flooring material gives you an all-purpose floor that's all ways good. Just look at these important advantages.

1. ***Durability.*** Mastic floors made with Flintkote Flooring Emulsion take constant traffic, withstand heavy point loads . . . without shattering, and with a minimum of wear.
2. ***Maintenance.*** You can almost forget it. These heavy-duty floors do not crack or spall . . . are self-healing of minor scars and cuts. Can be patched if necessary, quickly and easily . . . and with a minimum of interruption to traffic.
3. ***Rapidly Installed.*** Either for new flooring or resurfacing, Mastic Floors made with Flintkote Emulsions are laid quickly. Can be installed over any clean, firm base, and are ready for normal traffic within 48 hours.
4. ***Better working conditions.*** Because these floors are dustless, resilient, shock-absorbing and sound-deadening, they help provide working conditions that are clean, comfortable and quiet.

And anywhere you want to spruce up a bit . . . in waiting rooms, office spaces, and the like . . . use Mastic Underlayment as the ideal leveling course beneath your decorative floor.

Get complete information on Flintkote Flooring Emulsions. Write today, and ask us to tell you how you can put station traffic on the right road with Mastic Floors.

THE FLINTKOTE COMPANY
Industrial Products Division
30 Rockefeller Plaza, New York 20, N. Y.
Gentlemen: Please send me your new FREE booklet on Flintkote Flooring Products.

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*Company*_____

*Street*_____ *City*_____ *Zone*_____

*State*_____ *Position*_____

REM-88

FLINTKOTE

Products for Industry

FLINTKOTE INDUSTRIAL PRODUCTS

ATLANTA • BOSTON • CHICAGO HEIGHTS • DETROIT • LOS ANGELES
NEW ORLEANS • WASHINGTON • TORONTO • MONTREAL

there's no *dozing* here

There's no "dozing" on the job with an Oliver "Cletrac" tractor. This hard-working, hard-hitting tractor with its Heil Trail-builder keeps any dirt-moving job going at top speed.

An Oliver "Cletrac" crawler tractor is a natural for dirt-moving. The famous "push that doesn't pause" puts more power behind the blade... lets you move more dirt in less time. There's always power on both tracks, even on the turns, permitting the tractor to handle off-center loads with ease. The pull of one track can be balanced against that of the other, eliminating the time-wasting, load-losing "jackknifing" required with ordinary tractors. With an Oliver "Cletrac," you can keep moving straight ahead with no wasted motion. And, since there is power on both tracks on the turns, it's a safer handling tractor on hills and rough ground.

For all the facts, see your Oliver "Cletrac" Dealer.

Cletrac
a product of

The OLIVER Corporation

INDUSTRIAL DIVISION: 19300 EUCLID AVE., CLEVELAND 17, OHIO

"THE SIGN OF EXTRA SERVICE"

If You're Doing JOBS Like These...

USE PORTABLE GRINDERS FOR:

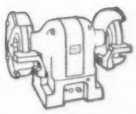
- Preparing surfaces for welding and smoothing welds.
- Snagging and grinding castings.
- Cutting off old rivets, studs, bolts.
- Removing rust, scale, old paint from tanks and structural metal.
- Grinding, cleaning and buffing frames, cabinets, other assemblies.

USE BENCH GRINDERS FOR:

- Sharpening cold chisels, wood chisels, twist drills and many other tools.
- Handling many types of grinding and metal removal.
- Removing rust; cleaning dirty, gummy parts; preparing surfaces for painting.
- Buffing and polishing plated metal surfaces.

PORTABLE GRINDER FEATURES:

- Splined gear mountings for perfect power transmission.
- Steel bearing inserts for smoother running.
- Welded steel wheel guard for extra safety.
- Complete abrasive dust protection for vital parts.



BENCH GRINDER FEATURES:

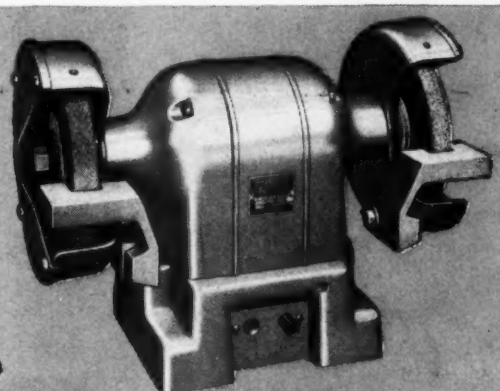
- Streamlined design for more work clearance and less weight.
- Adjustable U-shaped tool rests for better tool sharpening support.
- Strong steel wheel guards for extra safety.
- 8" and 10" Bench Grinders equipped for dust collecting systems.

- PLUS dependable B & D-built "constant speed" motors

...You'll Want Black & Decker Features Like These..

For TOP Performance from the FINEST Bench and Portable Grinders MADE!

4" Portable Grinder..$ 66.00 5" Model...$ 80.00 6" Model...$100.00



BENCH GRINDERS

6" Standard $38.00	8" Heavy-Duty $98.00
6" Heavy-Duty $58.00	10" Model $138.00

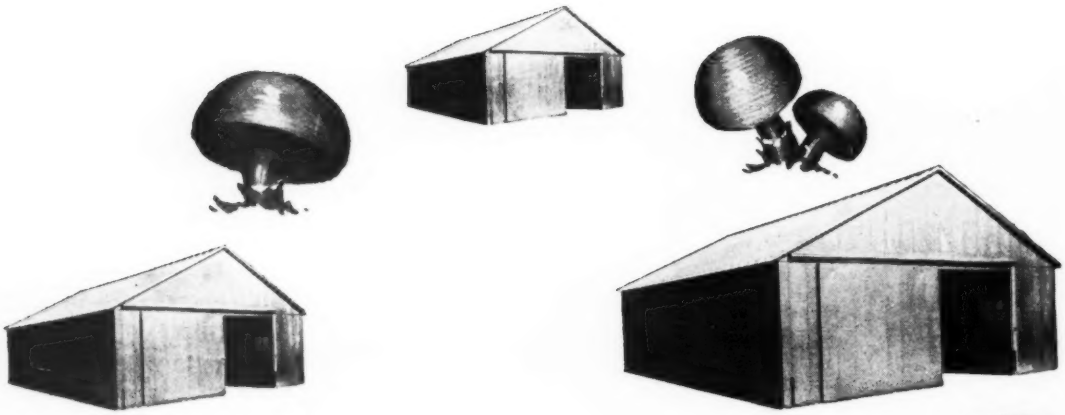
Select a Black & Decker Portable Grinder if you want to *bring the tool to the work!* Select a Black & Decker Bench Grinder if you want to *bring the work to the tool!* Whatever your particular need, you'll get years of top-notch service out of these husky, well-built Black & Decker Tools . . . while saving time and money in a hundred-and-one grinding jobs! Give your nearby Black & Decker Distributor a ring for full details on these hard-working Grinders. And write for our free catalog to: The Black & Decker Mfg. Co., 663 Pennsylvania Ave., Towson 4, Maryland.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS

DRILLS • SANDERS • SCREW DRIVERS
SAWS • HAMMERS • SHEARS



Mushrooms and Steelox

have something in common

STEELOX Buildings are so easy to erect they seem to pop up overnight. But there the similarity ends. You get a strong, tight, fire-resistant structure that is exceptionally low in cost.

Many railroad men praise ARMCO STEELOX as the answer to their permanent or temporary building problems. Prompt delivery and quick erection are not the only reasons. With all their strength, STEELOX Panels are light and easy to handle. Unskilled labor does the work with simple instructions. The completed building is easy to wire and can be insulated. And whenever necessary STEELOX Buildings can be taken down and put up on another site.

Painting is easy because STEELOX Panels are made of Galvanized PAINTGRIP Steel. They can be painted immediately without acid etching or other pre-treatment. Long paint life is assured.

ARMCO STEELOX Buildings are just the thing for signal houses, warehouses, pump houses, tool houses, motor car garages, diesel facilities, and other installations where you need a permanent, easily-erected structure. Mail the coupon below for prices and complete data on your specific needs. Armco Drainage & Metal Products, Inc., 1595 Curtis Street, Middletown, Ohio.

Export: Armco International Corporation.

ARMCO

ARMCO

STEELOX BUILDINGS

Send me data on ARMCO STEELOX Buildings

Type of Building_____

Approximate Size_____

Name_____

Street_____

City_____ State_____

For additional information, use postcard, pages 839-840

The last of the "Big Freeze"

Today, a leading mid-Western railroad is using a unique and economical method of preventing joint bars freezing to rail ends.

Employing oxyacetylene flame cleaning, mill scale, rust and surface moisture are effectively removed from new and relay rail ends. This, plus a special oil treatment assures a long-lasting, corrosion-resistant surface – a surface that in itself eliminates metal to metal freezing.

The operation is carried out just behind the rail laying crane. The ends of the rail within the area of the joint bars are flame cleaned with an oxyacetylene torch, equipped with a special Airco tip. After applying the flame, the rail is wire brushed and oiled with a special preservative while it is still warm. The joint bars are then positioned and bolted into place.

One torch operator and helper is able to flame clean 280 rail joints in eight hours by this method . . . at a unit cost of about 16¢ per joint.

For more information about flame cleaning and other cost saving methods as applied to railroad maintenance work, simply write for the 46-page booklet, "Oxyacetylene Flame Processes and Arc Welding in Railroad Maintenance Operations." Address your nearest Airco office. In Texas: Magnolia Airco Gas Products Company . . . On West Coast: Air Reduction Pacific Company.

Costs Come Down Under the Airco Plan

AIRCO **AIR REDUCTION**

Offices in all principal cities

Headquarters for Oxygen, Acetylene and Other Gases... Carbide... Gas Welding and Cutting Machines, Apparatus and Supplies... Arc Welders, Electrodes and Accessories

BEALL Hi-Duty SPRING WASHERS are made especially to stand the strain of the heavy-duty rail service required by today's high-speed freight and passenger trains.

These washers are strong and tough, yet provide the necessary "springing action" required at rail joints, frogs and crossings.

We control every step of their manufacture—from the specification of the specially-developed formula and process used in making the steel to the forming, hardening, tempering and testing operations.

BEALL TOOL DIVISION *of Hubbard & Co.*
EAST ALTON, ILL.

Specialist Manufacturers of Spring Washers

BEALL Hi-Duty
SPRING WASHERS
MADE ESPECIALLY FOR RAILROAD SERVICE

The Right Tools for the Job

PITTSBURGH PIPE CLEANING

PITTSBURGH ERIC PROCESS

ENGINEERING SURVEY
HYDRAULIC ANALYSIS
SEWER ANALYSIS

EXPERIENCE and research on every type of pipe and tube cleaning job have combined in the development of the special equipment used by Pittsburgh Pipe Cleaner Company. Proper tools are essential in achieving successful pipe cleaning results . . . and Pittsburgh Pipe Cleaner Company has them.

You may rest assured that when you employ Pittsburgh Pipe Cleaner Company's contract pipe cleaning service for your waste water lines, water mains, and sewers, you benefit by the most efficient equipment that pipe-cleaning know-how has yet designed. Your water and drainage systems are thoroughly cleaned, and restored to maximum efficiency . . . economically and quickly.

Let us show you how you can save your plant money and increase production efficiency through our contract pipe cleaning service. Just call or write our office nearest to you.

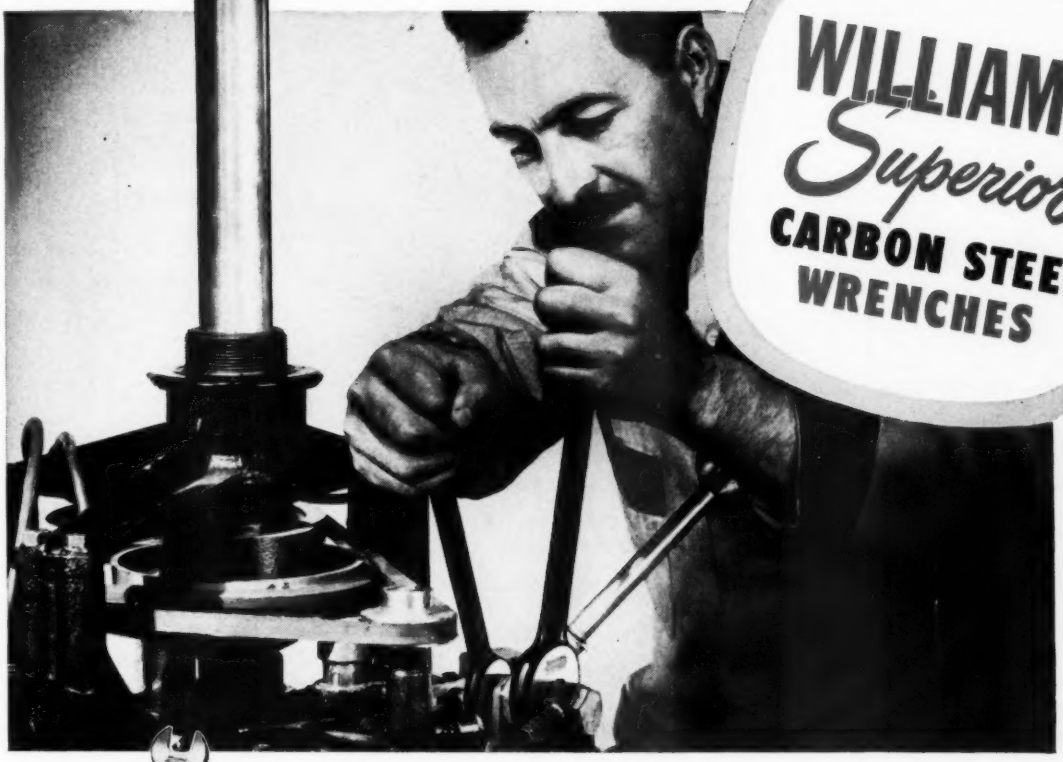
The hydraulic cleaning tool shown above is one of many specially designed tools that have enabled Pittsburgh Pipe Cleaner Company to successfully accomplish every type of pipe cleaning job. Our engineers will be glad to consult with you on your pipe cleaning problems. There's no obligation, of course.

AND NOW . . . A complete Survey of your Water Supply and Disposal Problems

PITTSBURGH PIPE CLEANER CO.
133 DAHLEM ST. PITTSBURGH 6, PA.

PHILADELPHIA · BALTIMORE · WASHINGTON
NEW YORK · BUFFALO · CHICAGO
CINCINNATI · ST. LOUIS · DETROIT · BOSTON

Industry's Favorite



WILLIAMS *Superior* **CARBON STEEL WRENCHES**

• 50 PATTERNS • 1000 SIZES

Modern industry rates Williams Superior Carbon Steel Wrenches first choice for true operating economy. Forged from carbon steel and specially processed to exacting specifications, these wrenches are substantially twice as strong as old-fashioned carbon steel wrenches. Available in a complete line to meet EVERY wrench requirement, they are the practical and economical choice for industrial service.

WILLIAMS

• OUR DISTRIBUTOR IS YOUR LOCAL WAREHOUSE

OPEN END, BOX, ADJUSTABLE & RATCHET WRENCHES; DETACHABLE SOCKETS & SETS; IMPACT SOCKETS; TOOL HOLDERS; LATHE DOGS; "C" CLAMPS; CHAIN PIPE TONGS & VISES; FLANGE JACKS; PLIERS; SCREWDRIVERS; PUNCHES & CHISELS; SOFT FACED "NUPLAFLEX" TIPPED HAMMERS; HOIST HOOKS; EYE BOLTS; ROD ENDS; CRANK & BALANCE HANDLES; THUMB SCREWS & NUTS

J. H. WILLIAMS & CO., BUFFALO 7, N. Y. *Distributors Everywhere*

TAMPING ROADBEDS WITH BARCO MEANS...

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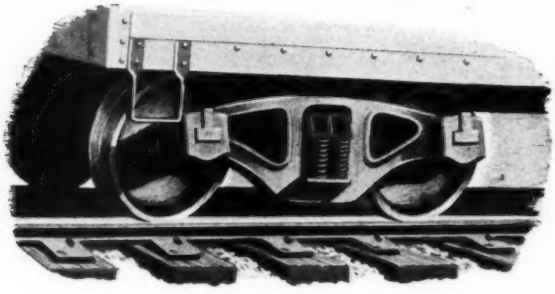
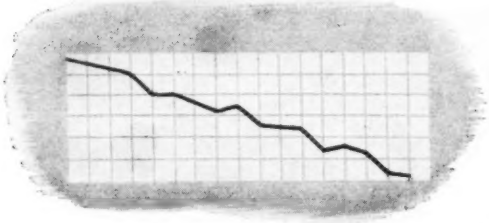


Maintenance Costs Go Down

ROADBED UPKEEP



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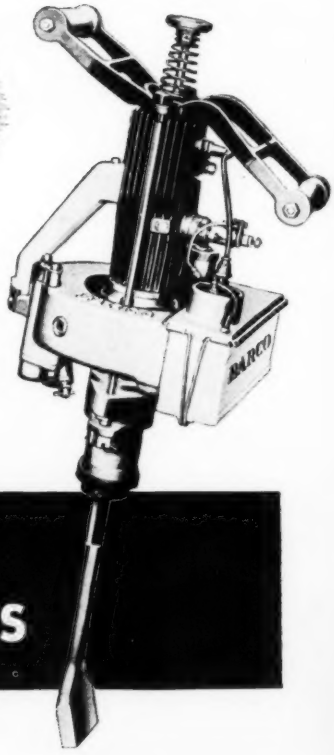

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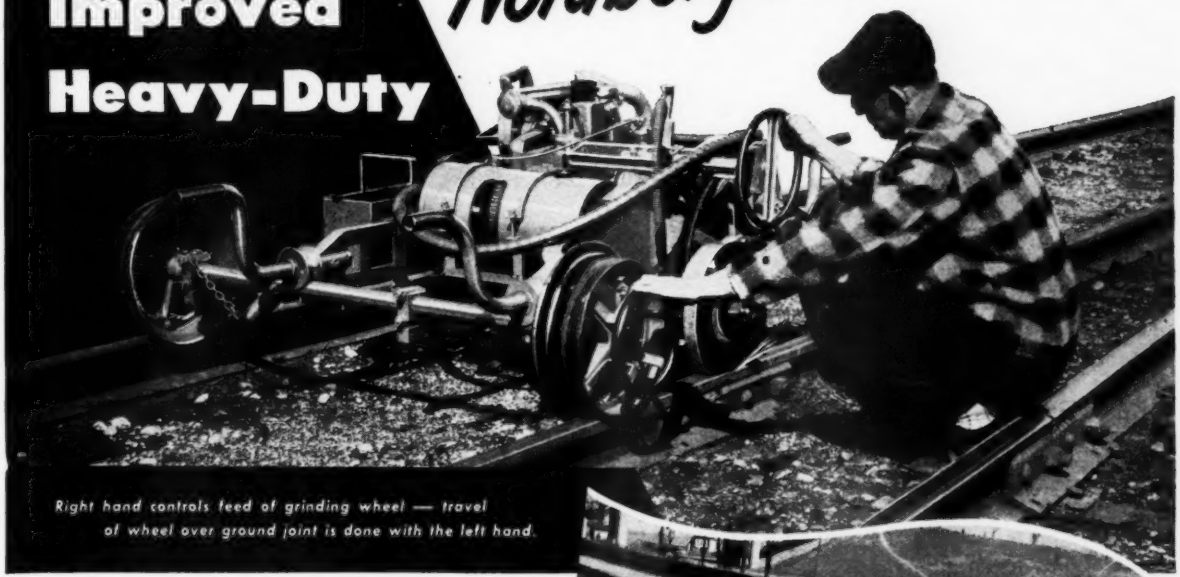
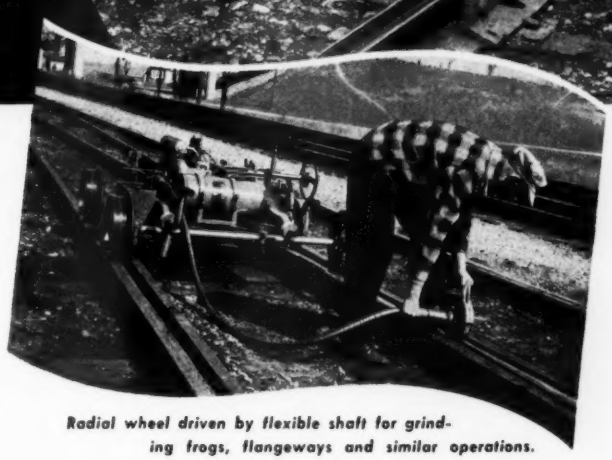


Right hand controls feed of grinding wheel — travel of wheel over ground joint is done with the left hand.



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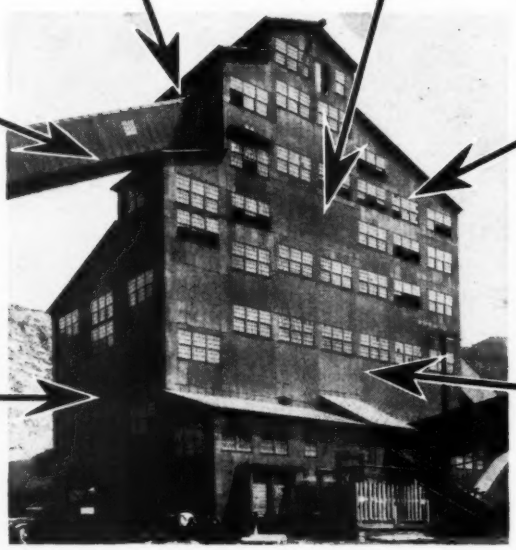

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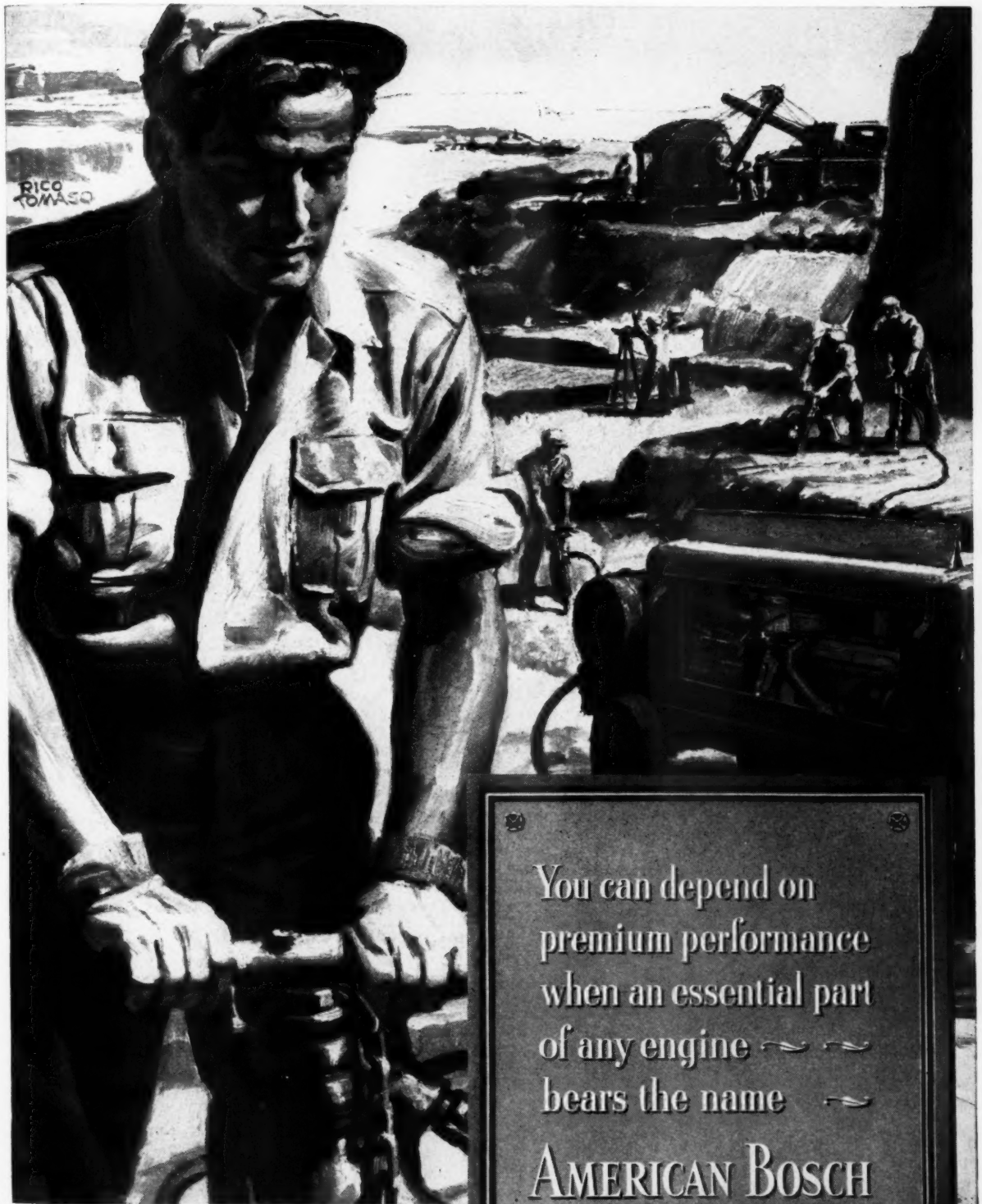

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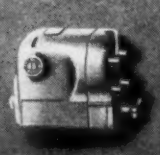

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Engineering and Maintenance

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Subject: Another Service to You

August 1, 1948

Dear Readers:

With this issue, Railway Engineering and Maintenance completes one series of five articles—on How to Get Better Concrete on the Railroads—and starts a new series of six articles—on How to Maintain Railroad Curves With a String. These two series supplement others run during the last two or three years where such were necessary to develop a subject fully and comprehensively—and we are prepared to run still other series where the need arises and this appears to be the best way to serve you.

In each of these series we have spared no effort to bring you accurate, detailed information on latest methods and practices, and have sought out authors best qualified by training and experience to present the subjects. Furthermore, manuscripts have been checked and rechecked by other specialists and have then been presented with the most informative illustrations that could be obtained.

Our new series on String Lining is no exception. In the first place, the author, W. H. Lord, assistant division engineer on the Nashville, Chattanooga & St. Louis, at Chattanooga, Tenn., is a master of the string-lining method, having applied it to hundreds of curves during the last 20 years or more under widely varying conditions, with uniform success. In the second place, the manuscript has been more than a year in the making and has been reviewed critically by a number of men fully versed in string-lining methods. Furthermore, a recent special trip over the author's division on a motor car has produced a complete set of photographs to illustrate the series in the most comprehensive manner.

Fortunately, string lining is a relatively simple procedure and thus can be employed quickly and successfully by supervisors, roadmasters and engineering parties, with the aid of the section forces in the taking of field measurements and in staking out the revised alinement. But as a special aid to ready understanding of the details involved, the author has been painstaking in his explanations and has included several typical examples of the calculations involved under varying curve conditions. In spite of this, the warning is given that some details will require more than ordinary attention on the part of the reader, and that some may actually prove confusing until thoroughly understood and mastered. However, the author claims that any such difficulty will be resolved with proper concentration and study and a few trials in the field.

We are pleased to present this new group of articles. No claim is made that the method described is original or new, nor that it is the only procedure by means of which curves can be lined with a string. But it is claimed that the method—applied with the degree of refinement required by the train speeds involved—is practical, flexible, effective and economical of application—and is adapted to correcting the alinement of any type of curve.

We commend this new series to you for thoughtful reading and study, and hope that it proves as interesting and helpful as we believe it will.

Sincerely,

Neal D. Howard
Editor

NDH:ag

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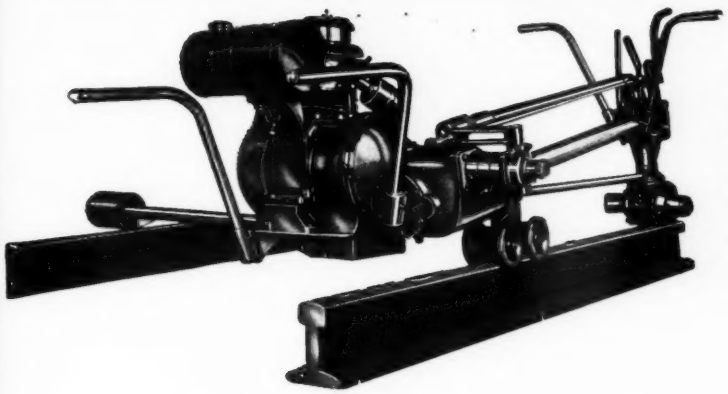

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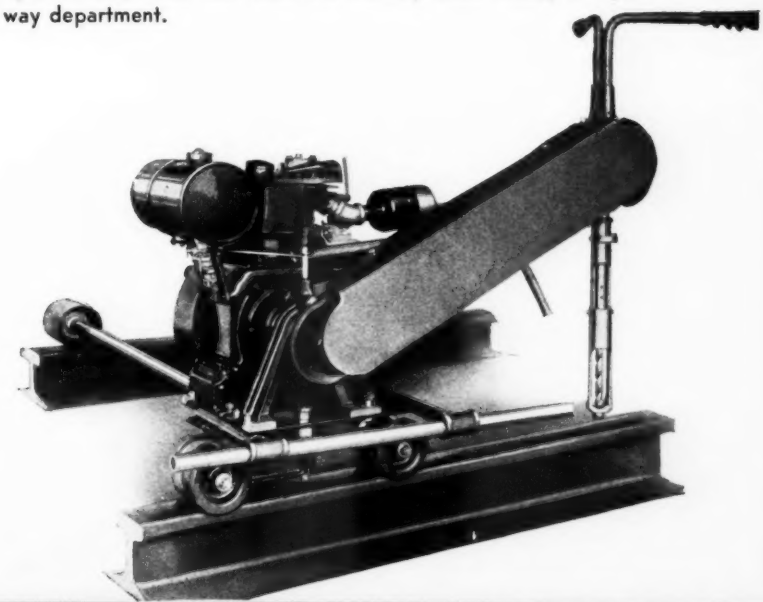

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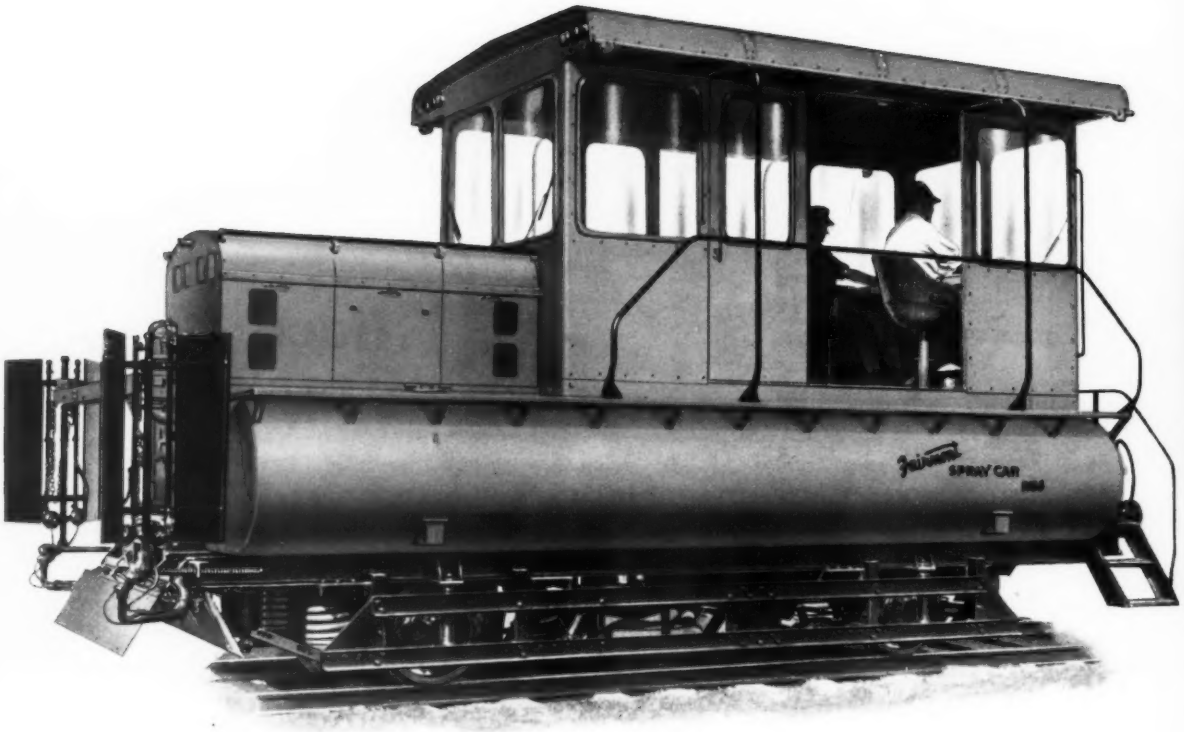

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Railroad Equipment—Differing Practices—Supervisors

Sand "Shots" Cure "Ailing" Roadbeds - - - - - - - - - - - 803

Describes one of the unusual methods developed by, and being used on, the Southern to reduce maintenance costs of "soft track"

Maintaining Railroad Curves With a String - - - - - - - - - 806

The first of a series of six articles describing in detail a quick, flexible and economical method of correcting alinement

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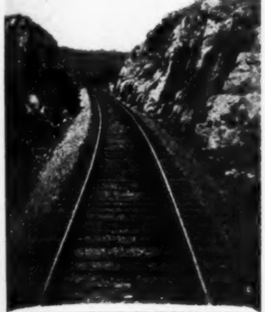

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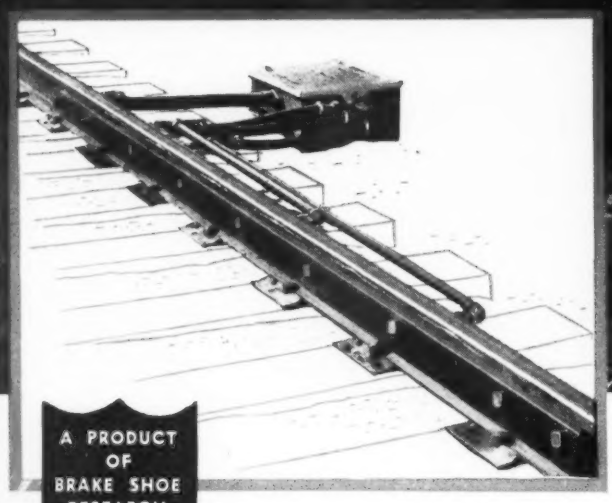

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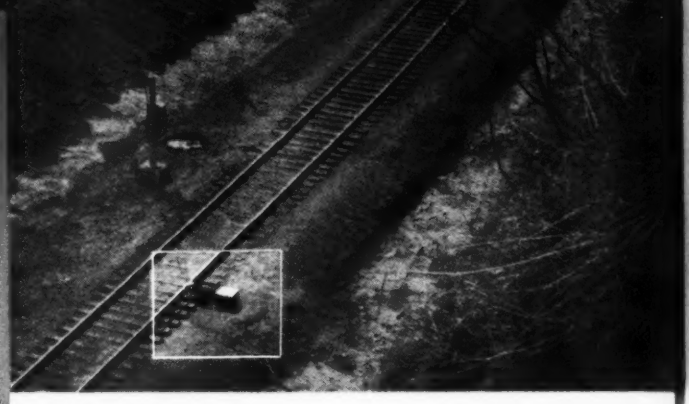

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Railway Engineering and Maintenance

Railroad Equipment—

Is It Outstripping Developments in the Fixed Properties?

Railway engineering and maintenance officers have much of which to be proud in any comparison of present-day construction and maintenance practices with those of only a decade or two ago. However, in spite of marked advances in their standards and techniques, they may well look to their laurels as the mechanical departments of the railways, aided by the car and locomotive builders, step way out in the limelight with their part of the railroad plant.

Officers in charge of the fixed properties are well aware of the rapid advances of Diesel-electric motive power on the railways during the last 10 or 15 years, but may not realize that, starting practically from scratch in 1934, there are today more than 6,600 Diesel locomotive units on the railways of the United States—and that the number is expanding at an accelerated rate. These officers are well aware, too, of the advances that have been made in passenger train equipment, and of the increased number of high-speed trains that are streaking over the rails in all parts of the country. Like the public, however, they may well be amazed with the imagination, engineering, design and artistry that have gone into the newer coaches, sleepers, diners, and observation and club-lounge cars, as exemplified by special shock-absorbing trucks, tight-lock couplers, draftless air conditioning, fluorescent lighting, radio entertainment, reclining seats, colorful upholstery, snack bars, observation domes, etc. Of these improvements, there appears to be no end, each road, with each new set of equipment, seemingly endeavoring to outstrip in comfort and luxury all other railroad facilities on wheels. In all of this development, the mechanical departments of the railways are "up to their necks."

But these developments are only the surface manifestation of what is going on behind the scenes. Working with the locomotive, electrical, boiler and specialty builders, the mechanical departments of the railways are today far advanced in the practical design and development of larger and more powerful electric locomotives than ever built before; of coal-burning steam turbine locomotives with both mechanical and electric drives; and of gas-turbine locomotives designed to burn oil or coal. Under test, too, is a passenger car stabilizer—the outgrowth of experience with gyroscopes during the war—which, it is said, will soften up-and-down car motion inevitable at high speeds, even on well-ballasted track. This device also provides for automatic banking on curves and is expected to permit increases in train speeds on curves, with comfort, of as much as 15 to 25 per cent, while reducing the destructive forces on the track.

Another development that must be mentioned, even though still in the development stage, is Train X of the Chesapeake & Ohio—a fully integrated group of car units with radically new features of design, including two-wheel trucks and a greatly lowered center of gravity. It is said that this train, which will weigh only approximately one-third the weight of present light-weight equipment, will have a top speed of 150 m.p.h. and will automatically bank itself into a curve like a bicyclist.

If further evidence is needed that railroad equipment is in the ascendency over the fixed properties, a look in on the Railroad Fair at Chicago, with its dominating array of motive power and rolling stock, will be convincing —and a check of railroad capital expenditures for the last couple of decades will be conclusive. A quick look at the record in this regard shows that, whereas between 1925 and 1936 capital expenditures for additions to and betterments of the roadway always exceeded similar expenditures for equipment, ranging from a ratio of 55:45 in 1925, to 85:15 in 1933, the

trend was completely reversed in 1936. Since that year, to and including 1947, annual capital expenditures for equipment have consistently exceeded those for additions to and betterments of the fixed properties—reaching a ratio of approximately 68:32 in 1947. And, apparently, the end is not in sight, as, according to estimates compiled by the Bureau of Transport Economics and Statistics of the Interstate Commerce Commission, the Class I line-haul steam railways of the country, during the first three-fourths of 1948, will spend $725,862,000 for equipment and $227,626,000 for fixed properties, or at a ratio of more than three to one.

What do these developments and changes mean to those in responsible charge of the fixed properties? Why so radical a swing to equipment? How long can this greatly unbalanced condition continue? Can earnings and venture capital be spent more profitably on equipment than in improving the standards of track, for example, and for means of reducing present high track maintenance costs? Do the facts indicate that the mechanical officers of the railways and their counterparts in the equipment industry are more progressive than those whose primary interest lies in the fixed properties?

These are interesting questions, the many angles of which may well be pondered by railway engineering and maintenance officers. They may have a deep significance for everyone in the roadway and structures department—indeed, for the railroads as a whole.

Differing Practices—

Are They Based on Performance or Prejudice?

RAILWAY engineering and maintenance officers have always been known as individualists in that they are prone to harbor rather definite ideas regarding the relative merits of different designs, devices, machines, types of construction and methods of doing work. In the earlier days of railroading this trait was carried to extremes; each railroad had its own standards for practically every phase of the work and structures under its supervision—and frequently there was wide variation in these standards between different roads.

To an important degree this desire for individual standards has been subordinated in recent years to the extent that the multitudes of different standards formerly prevailing have in many instances been greatly reduced, with resulting substantial advantages, especially in the form of reduced manufacturing costs. However, engineers and maintenance men still have many sharp differences of opinion regarding the merits of some products, designs or methods. Not infrequently one of them is heard to speak in extremely derogatory terms regarding a device or machine that is in extensive use, presumably with entirely satisfactory results, on another road.

No doubt there are frequently sound reasons for such differences of opinion, especially where there are variations in local conditions. Standards of procedure should, of course, be sufficiently flexible to allow for such variations. Conceivably it is also possible that widely different practices will sometimes give equally good results under the same conditions. These differences in practice may be regarded as manifestations of our free-enterprise system at work and as such are a favorable sign.

But where a practice is continued in use although it is known that another practice is giving better results under the same conditions, then somebody is wrong. An example of this is where a road persistently refuses to make use of a maintenance practice long after it has been widely adopted as the best by other lines. This is where vanity and prejudice enter the picture. Such traits are incompatible with sound engineering. Where events have proved that a practice has been out-moded by subsequent developments, or was based on poor judgment in the first place, the engineer should acknowledge the situation and do his best to correct it.

Supervisors—

Knowledge of Off-Line Practices Is Helpful

TO see how a job is being done by the other fellow is one of the most broadening influences to which a person can subject himself. This statement is particularly appropos in railway maintenance work where the rapidly shifting scene in methods and equipment has produced a situation where constant alertness is necessary.

Railway men as a whole were recently subjected to the criticism that their knowledge of railroading, and their work, is too often confined to the practices in vogue on their own lines or even, in the case of men down in the ranks, of a limited territory of the employing road. The extent to which this criticism may be directed at maintenance men probably varies with their rank. A practice that seems to be gaining in acceptance is for a road to send representatives of its engineering and maintenance department to other lines to inspect machines, methods or installations that are deemed to be of unusual interest. However, the privilege of making such trips is one that is usually reserved for the higher officers. Such officers also are frequently able to participate in inspection trips under official auspices, such as those of A.R.E.A. committees, and, in addition, they have a certain amount of freedom in following other lines of investigation.

But what of supervisory officers of lessor rank, such as roadmasters, track supervisors or their assistants? There are various ways in which these men can further their knowledge of the field, such as by reading technical literature and by participating in the work of the associations. But would it not be of considerable help to see how things are done on neighboring lines?

If this suggestion is considered worthwhile there are various ways in which it could be put into practice by individual supervisors, possibly working with their superiors. Perhaps it would not be too far-fetched for the supervisor actively to seek assignments for inspecting and reporting on practices of other roads. In the absence of these more extensive trips he could at least take advantage of such opportunities as his daily work affords to pay brief visits to gangs or equipment on adjacent lines. Such inquisitiveness is certain to bring handsome returns.

This view of a "blasting-and-sanding" operation shows one of the spuds being driven, another being pulled, and sand being blown into the roadbed. A pipe sleeve (right foreground) awaits the insertion of dynamite. The buckets in foreground contain dry sand

Sand "Shots" Cure "Ailing" Roadbeds

The Southern is stabilizing roadbed by injecting sand into the subgrade in two different ways. On the basis of experience to date, both methods are producing excellent results. In this article, one of these, known as the "blasting-and-sanding" method, is described as it was developed and is being used on the Washington division. A description of the other, called the "sand-pile" method, developed and used extensively on the Western lines of the road, will be presented in a subsequent issue.

TWO unusual methods of roadbed stabilization are being employed on the Southern to remove slow orders and reduce the maintenance costs of "soft track." These schemes are similar to each other in that they use sand as a means of increasing the subgrade stability, but they differ in the manner of utilizing the sand. While neither has been in service long enough to permit conclusions to be drawn regarding its long-term effectiveness, each, in a single year, has reduced maintenance expense by as much as the cost of its application.

One of these methods, called the "blasting-and-sanding" method, consists essentially of driving steel spuds through the ballast and subgrade in a pattern of holes to an underlying stratum of rock or hard pan, inserting a small charge of dynamite in each hole thus formed, exploding the dynamite by an electric blasting machine, and then filling the craters formed below the ballast with dry sand under air pressure. In the other—known as the "sand-pile" method—a 12-in. by 12-in. timber spud is repeatedly driven 6 to 8 ft. into the ballast and subgrade, according to a predetermined pattern, depending upon conditions, is pulled, and the holes then filled with sand.

The blasting method, which does not entail the use of on-track equipment, was developed as a means of stabilizing roadbed on the Southern's Washington division between Alexandria, Va., and Orange, on which a high density of traffic is carried. This is a double-track line having 131-lb. rail laid on ties supported by granite ballast with a maximum size of 1½ in. The maximum scheduled speed of passenger trains is 70 m.p.h. for standard equipment, 80 m.p.h. for streamliners, and that of freight trains is 60 m.p.h.

In this territory there are many shallow fills, each of which was made on a relatively thin layer of clay or wet red shale lying on a stratum of hardpan or shale rock. Water pockets had developed at various locations in these fills, resulting in the softening of the subgrade at some points to such an extent that slow orders sometimes as restrictive as 10 m.p.h. had to be issued. The frequency of such slow orders disrupted the smooth operation of this division to the point that it become imperative that remedial measures be taken.

Preparatory to deciding what corrective action should be taken, investigations were made at the soft spots to determine the conditions causing the trouble and to provide a sound basis for comparing the results of any treatment to be used. These investigations, supplementing the history of the soft areas, consisted of: (1) Cross sections to bring out the irregularities in the fill slopes; (2) borings made along the cross-section lines to determine

moisture and densities; and (3) the taking of samples of soil for laboratory tests.

In addition, as part of the investigations, a careful search was made of all available published material on the stabilization of soils. In this study it was found that soils experts have offered at least four general theories as to how sand might be used to help stabilize roadbeds as follows:

(1) Sand introduced into an unstable roadbed tends to stabilize it by increasing internal friction between the particles, particularly where there is lateral displacement or pumping. (Dimitri P. Krynine, research associate, Yale University)

(2) A sand mat under wet roadbed has a tendency to break the line of capillarity, or reduce such capillarity, and to facilitate drainage. (Report of Dr. Arthur Casagrande, associate professor, Harvard University, and Wm. L. Shannon, Boston office of the United States Engineer District, Committee on Maintenance of Joints in Concrete Pavements)

(3) A mass of earth composed of fine particles in which there is evidence of capillary action has its moisture content reduced immediately when subjected to violent shock. This is brought about by compression of the water pockets and lines of capillarity. (Prof. Q. C. Ayres, Iowa State University)

(4) Explosion of dynamite at or near the point where lateral displacement of earth masses occurs under pressure causes disruption and disturbance of the line of shear or plane of slippage, and in many cases will result in an interlocking of these masses above and below this line when properly treated with sand. Also the free water table will be lowered.

First Blasting Installation

On the basis of these theories an experiment was started on the double-track Washington division in February, 1947, in which sand was used under pressure to fill shatter craters that had been blasted in the subgrade. A site was chosen for the experiment which was both a source of frequent complaints of rough track and typical of other stretches of unstable roadbed at many points on this division. At this location, designated as Mile Post 74, the offending conditions affected the southbound track for about 250 ft. each side of a small highway grade crossing. Here the tracks are laid on a light fill, the depth of which at the center line between tracks is only about two feet above solid rock. Furthermore, this rock slopes downward under the southbound track to the bottom of a ditch parallel with and about 21 ft. from the center line of this track. The flow line of this ditch is only four feet below the berm. Drainage was good but the flow of water along the surface of the rock reduced the frictional resistance between this surface and the material above it to such an extent as to permit the latter to slip downward and outward toward the ditch. The southbound track consequently settled to such an extent that surfacing was required every week during wet weather.

In applying the blasting method at this location, holes were driven vertically to rock at the outside ends of the ties in the southbound track, on four-foot centers, for the entire length of the affected area. A crater was blasted at the bottom of each hole and then filled with sand. Throughout the area of greatest movement—100 ft. north and 170 ft. south of the crossing—a second and a third row of sand-filled craters were established parallel to the first row and 3 ft. and 6½ ft. out from it, respectively. In this area a total of 260 holes was driven and 60 cu. yd. of sand were used.

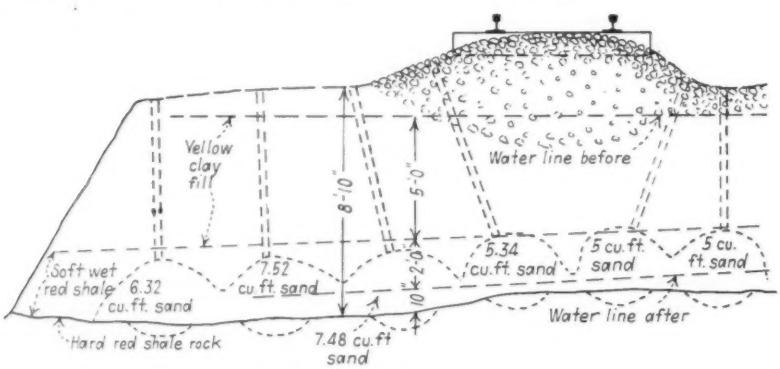
Immediately after the blasting and sand-impregnating operations were completed the track was surfaced. Six weeks later it was reported by the local division engineer that, in spite of continually wet weather, the track had not required smoothing. During the following seven months there were no reports of rough track at this location, and during this period no surfacing was required.

The effectiveness of this method of stabilizing the type of roadbed existing on the Washington division was so apparent immediately that a continuous program was developed, a regular gang organized to do the work, and plans instituted to improve the technique so as to reduce the unit cost. Between February and October, 1947, 11 locations were completed, all but two of which were on fills. A second blasting-and-sanding gang was added to increase the amount of work done, and both organizations are scheduled to work throughout 1948.

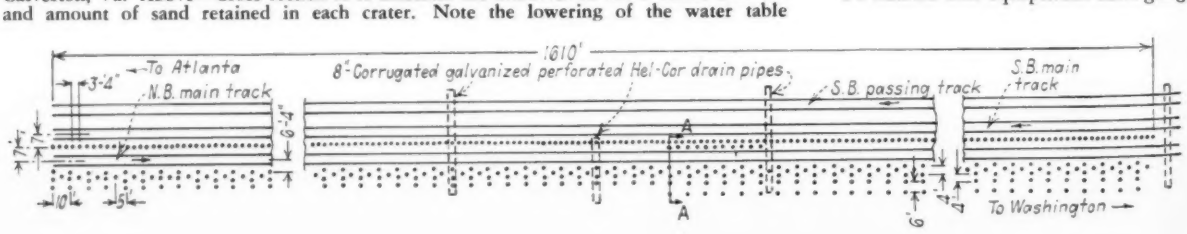
The technique so far developed for the blasting-and-sanding operations includes the drying of sand at regular drying points and delivering it in steel drums to the job where the following machines and tools are used by each organization.

- 2 60-cu. ft. Worthington compressors, mounted on pneumatic tires
- 1 Ingersoll-Rand hammer, Type R-63, for driving spuds
- 1 sandblowing machine and hose
- 1 detonating battery
- 2 12-lb. hammers
- 4 8-lb. hammers
- 2 24-in. pipe wrenches
- 3 pipe and spud pullers, each mounted on two wheels
- 12 driving spuds
- 3 lining bars
- sufficient 2-in. by 2-ft. pipe sleeves

To handle this equipment each gang



Below—Plan showing the pattern of spud holes which were driven at Mile Post 47, near Calverton, Va. Above—Cross section A-A indicates the character of the unstable roadbed and amount of sand retained in each crater. Note the lowering of the water table



is comprised of a foreman, seven laborers and one mechanic. The mechanic operates the air compressors, maintains the sand-blowing machine and handles the dynamite. Two laborers drive and remove spuds. One laborer operates the sandblowing machine, while two others keep it filled with sand. One man handles the sand hose filling the craters, and the seventh man cleans and dresses behind the operation.

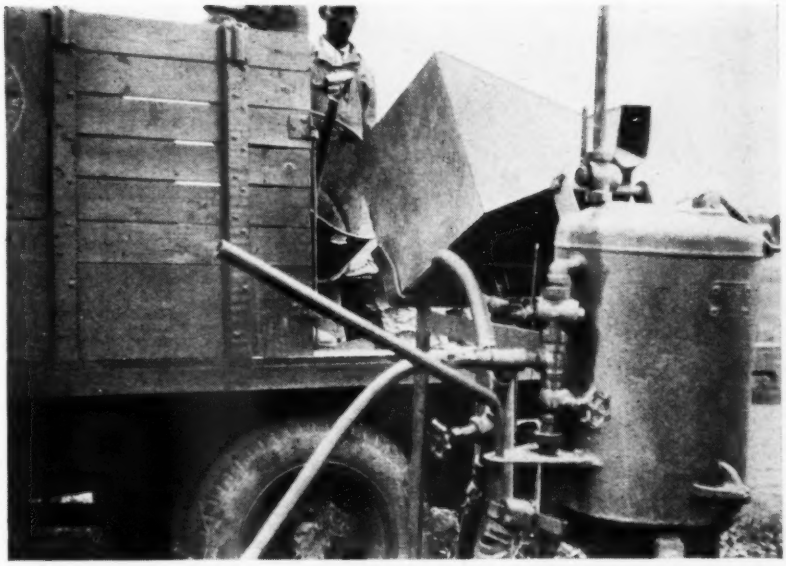
Special Procedure for Driving Spuds

Soon after the work was first begun at Mile Post 74, it was found that when a charge of dynamite was exploded in a hole driven through the ballast section, ballast stones would be dislodged and block the hole, so that sand could not be blown into the crater. To overcome this difficulty a special procedure for driving the spuds through the ballast section was evolved. A special 5-ft. spud was made, having a collar one foot from its driving end. This spud is inserted in a 2-in. pipe sleeve, varying in length from 2 to 4 ft., and driven into the ballast section until the collar engages the top of the pipe sleeve. Then, as driving continues, the collar forces the pipe sleeve through the ballast as far as desired. The spud is then pulled, allowing the sleeve to remain in place, following which a longer rod, 1¾ in. in diameter, is driven through the sleeve to the depth required.

To drive rods longer than 6 ft., which would be difficult without some form of platform or staging to permit holding the air hammer, a piece of 2½-in. pipe, 16 in. long, is first fastened securely on the bottom of the air hammer. Then the upper end of the rod is inserted in this pipe and the other end is inserted through the sleeve in the hole made by the short spud. With the hammer thus held in position for driving, its operation is controlled by an air valve located near the ground in the hose, until the rod has been driven deep enough to permit the hammer to be reached.

Blasting the Holes

When a hole has been driven as deep as necessary, the rod is removed. A series of these holes may be driven before each is loaded separately with ¼ to ½ stick of 60-per cent dynamite, which is exploded while the sleeve is still in the ballast. After the blast, a rod is run back through the sleeve to open the hole down to the crater. When this rod is pulled, sand is applied into the hole through a rubber hose from the sandblowing machine under 100-lb. pressure. When the crater and the hole have been filled with sand, the sleeve is pulled. The sleeves are not necessary anywhere except within the ballast section. Doing the work in this manner does not interfere with traffic in any way. The dynamite charges are varied according to the depth of the hole, with the result that the line and surface of the track are not disturbed enough to require a slow order.



Above—Sand which has been dried is delivered to the point of work in steel drums and fed into a sandblower (shown in the right foreground). Right—Two Worthington compressors supply air under pressure to operate the sandblower and pneumatic hammer

Another Job Described

It was in this manner that the work was performed at the fifth location stabilized, that at Mile Post 47, a cross section of which is shown in an accompanying illustration. At this location there are three tracks—northbound and southbound main tracks and a southbound passing track. Unstable roadbed existed under the northbound track from 202 ft. south of Mile Post 47 to 1,403 ft. north, a total of 1,605 ft. To correct the instability a row of craters, with the craters 40 in. apart, was blasted and filled with sand midway between the main tracks for the entire length of the affected roadbed. An additional row of craters was blasted and sanded between this row and the northbound track at a particularly bad spot 50 ft. long about 450 ft. north of Mile Post 47. Outside the northbound track, the holes were blasted in rows 10 ft. apart transverse to the tracks. Each transverse row south of the south end of the bad spot contained three holes and those through and north of it contained four. An additional hole was made midway between adjacent rows at the intersection of the diagonals of the box formed by the first and second holes of these rows from the track.

Slopes of the Holes

The holes driven adjacent to the ends of the ties were angled in toward the track so that, while beng driven, the spud and pipe would clear trains. The slopes of these holes were made such that the blasts would occur at points about under the gage sides of the rails. All other holes are driven more or less vertically. In one row of holes at the particularly bad spot men-

(*Continued on page* 814)

Maintaining Railroad Curves

Right—Two men hold the string against the gage side of the rail head at two stations while a third man measures the ordinate at the station halfway between them. Below—The author "computes" a curve in the quiet of his office

In view of the increasing importance of good-riding, economically-maintained railroad curves under present-day, high-speed, generally-improved train operation, *Railway Engineering and Maintenance* begins this series of articles on how to adjust and maintain curves to a high degree of excellence, employing a string, a rule, and, at most, a few other simple tools. Prepared by a practical trackman and engineer with many years' experience in maintaining curved track in a semi-mountainous territory, this series is a serious and generous attempt on the part of the author to pass on to others, as clearly and concisely as possible, detailed instructions in a method of adjusting and maintaining curves which has proved highly effective, thoroughly practical, and relatively simple. In successive articles of the series, the author not only explains the method in detail, but by actual examples shows its application to simple, compound, and reversed curves. As a whole, the series should not only be a manual of instructions for the beginner, whether foreman, supervisor or engineer, but also a valuable reference text book for those experienced in general stringlining methods.—Editor

ALL railroad men know that railroad tracks are composed of tangents connected by curves. Most of them know that the tangents are kept in line easily and that the rails are kept level with each other by means of a tool known as a "level." Most of them also know that the real difficulty is to keep the curves in line and the outer rail at a fixed and uniform elevation above the inner rail so that locomotives and cars will tilt inward, and thus offset the tendency for them to overturn outward due to centrifugal force while traveling around the curves.

Fundamental Principle Explained

When most of our railroads were built, engineering parties set stakes along the center lines of the tangents and connected the tangents with curves, usually of fixed degree and radius. As it was necessary that the rails on tangents be level across the track, and that the outer rails on curves be elevated a sufficient amount to offset the tendency to overturn, there was a requirement that was obviously impossible of fulfillment directly at the points where tangents and curves joined; the rails could not be level and have the outer one raised at the same time. Therefore, it was necessary to insert curves of varying radius between tangents and uniform curves, starting in the tangent and gradually increasing in degree of curvature until it equaled that of the body of the curve. These easement curves are spirals, and they are now considered an essential part of all curves in main tracks.

Track maintenance men know that a curve of uniform degree is in line when the distance between the midpoint of a string stretched between any two points on the gage side of the outer rail, and the rail itself, is the same at all points. Near the ends of the curve, however, when a spiral is introduced, this distance, called the ordinate, decreases gradually and uniformly—to zero when the entire length of the string is on the tangent. The foregoing is true, of course, only when the track is in perfect line throughout the curve.

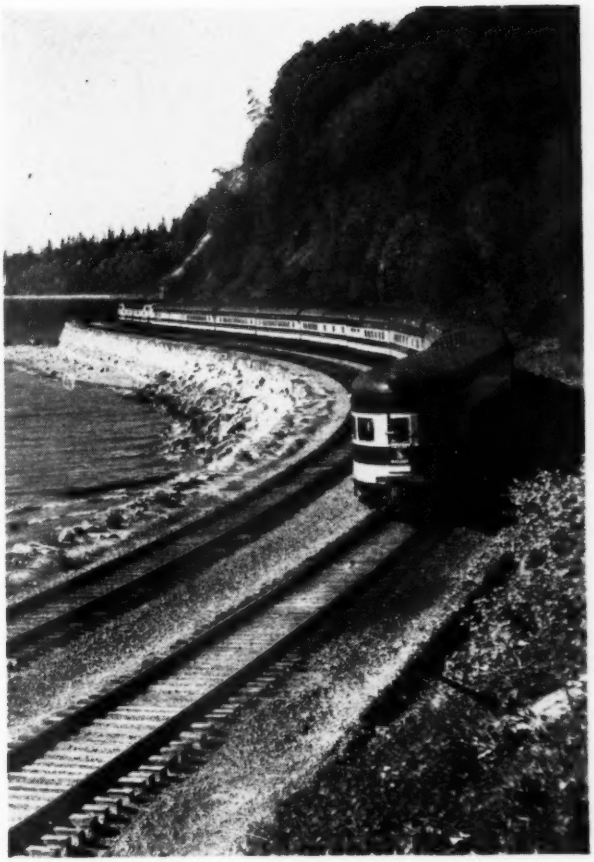
When the string measurements are made on a curve being used by trains, the ordinates will not be uniform on the body of the curve nor will they increase or decrease at a smooth, gradual rate on the spirals, but will vary, some above and others below the average values. The line on such curves can be improved very much by throwing the track inwardly where the ordinates are larger than the average and outwardly where the ordinates are smaller than the average, but the foreman, ordinarily, has no way of knowing just how much to shift the track at each point. If, after shifting the track at any point by any amount, the middle of the string opposite the point of throw is moved

With a String

The first of a series of six articles describing in detail a method of correcting alinement which is quicker, easier, more flexible, and less costly than the results obtained with a transit*

Part I of a Series

By W. H. LORD
Assistant Division Engineer
Nashville, Chattanooga & St. Louis
Chattanooga, Tenn.



Modern, high-speed trains demand a high degree of perfection in curve alinement

to a point opposite the point on the rail where one end of the string was originally, that is, one-half of the length of the string in either direction, the ordinate at this latter point will be found to have changed from its previous value by one-half of the amount the track was shifted at the first point, but in the opposite direction. This is because one end of the string is against the point of rail that was shifted.

In Fig. 1, for example, if after shifting the track outward from C to D, the string B-H is moved to the position A-D, bringing the center of the string (E) now to the point F, the former ordinate B-G will be reduced to B-F, and it will be found that the amount it has been reduced (F-G) is equal to one-half the amount the ordinate E-C was increased, or one-half D-C.

If the ordinate at three points, each one-half the length of the string apart, are measured and found to be in proportion to the numbers 18, 24 and 18, movement of the track inward so that the middle one of the three ordinates becomes 20, that is, a decrease of four, will increase the ordinates at the other two stations by half of four, or two, so they will then equal 20 also. *This is the fundamental principle involved in string lining.* However, in the case cited, in spite of the fact that all three points would then be in a true curve, they might not be in the curve desired. This curve might be outside or inside the curve wanted, and might not be parallel to it. To get the curve wanted, all of the ordinates throughout the curve must be taken into consideration and brought into correct relation with each other.

Cut-and-Try Methods

The practical trackman, when about to correct the alinement of a curve with a string, measures off uniform stations all the way around the curve, making the stations one-half the length of the string he wants to use. Most foremen use 31-ft. stations and a 62-ft. string because the middle ordinate of a 62-ft. chord—in inches — is approximately equal to the degree of curve. Regardless of the length of chord used, he measures the ordinate at each station while the ends of the string are pressed against the lower part of the head of the rail at the stations on either side of the points where he measures the ordinates — the string being moved ahead one station at a time. He marks the measurements on the rail or tie at each station and then assumes an average value of these measurements to which he tries to throw the track at each station. This is a slow and costly procedure, as he must re-measure after throwing the track and try to correct the inequalities he finds by throwing the track again and again until he obtains a fairly uniform curve.

Many methods have been devised for computing the throws at each station from a list of the originally measured ordinates. Some are exceedingly complicated; some are only approximately correct and are but little better than the method used by the trackman.

Bartlett Method

The writer was using a text book translated from the German when a series of articles on string lining was published in *Railway Engineering and Maintenance*, from January to July, 1928. The author of this series, Charles A. Bartlett, then in the engineering department of the Illinois Central, described a simple method of computing the throws to make any curve practically perfect. At the same time the method was flexible enough to permit following the road-

*Copyrighted by Simmons-Boardman Publishing Corporation.

bed closely, with the throws limited to any fixed amount. His method permits the revised alinement to be shifted to clear obstructions or to pass over the centers of bridges or other fixed points; it is so flexible that it allows different spirals to be used at the ends of curves if needed or desirable. Withal, it is so simple that any track supervisor or roadmaster can learn it quickly, and the only knowledge of mathematics necessary in its use is how to add positive and negative figures.

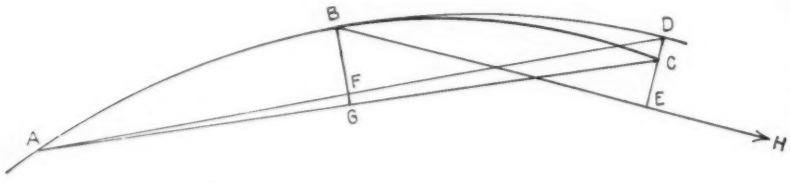


Fig. 1—Effect of throw on adjacent stations
If Station C is thrown outward to D, Ordinate CE will be increased to DE and Ordinate BG will be reduced to BF. FG is equal to one-half of CD.

Needless to say, the writer threw away the German text book and has been using the Bartlett method ever since. Literally thousands of curves have been corrected by this method at minimum cost to the railways, and with a precision equal to or better than that possible with a transit. Furthermore, many curves have been relined by this method under conditions where the use of instruments would have been impossible. Problems involving compound curves, with spirals between the portions with different radii, are solved as readily as simple curves, and the points of compounding can be shifted ahead or back as needed to stay within the limit of throw permitted or possible. Traffic merely delays the work while trains pass and the measurements are resumed immediately, without awaiting any backsights, the setting up of instruments or retracing any of the work already done.

The force required to use the method consists only of two unskilled men to hold the ends of the string while the ordinates are being measured, and two men to drive the stakes after the curve has been computed. However, it is a good plan to have a recorder to record the ordinates, and, if the work is complicated, this man should be the computer also. For simple curves, the supervisor, roadmaster or a smart foreman can take the measurements and send them to the office for computing of the throws, which can be listed and returned to him so he can set the stakes.

When working complicated situations, it is a good plan for the computor to be present to see that all side measurements needed are obtained, and to give him actual knowledge of the conditions to guide him in computing the throws. This is particularly true where compound or reversed curves occur in narrow rock cuts or tunnels, or under overhead structures. Under such conditions, side clearances are very important. The computer will know from experience where the shift is likely to be large, and he can get ample side measurements at these points to assure himself that the throws he figures will not be prohibited by insufficient side clearances.

Length of Chord

First, always measuring on the outer rail, the curve must be laid out in uniform stations, of such length that the distance between any two stations will equal the length of chord to be used. The best length for this chord is two rail lengths if the outer rail is laid with rails of uniform length. Station points may be located directly at joints or at any point between joints.

There are several excellent reasons why chords of two rail lengths should be used, but the chief reason is that a stake is driven finally at each station and, if any other length chord is used one stake will be opposite a joint, the next some distance away from the joint, the next still farther away—perhaps at the quarter—and so on, gaining or losing each time until stakes will be setting at every possible relationship to the joints. Then when the track is lined to the stakes, the irregularities in the original rails will not be uniformly corrected and small variations will occur which will affect the riding quality of the track, and the curve will soon be out of line again. When full rail lengths are used, every stake is placed in about the same relation to a joint as every other stake, and the result is a true curve which rides smoothly and stays in true alinement for a long time.

Many engineers object to the rail-length method because no allowance is made for the size of the joint gaps. They think this will affect the accuracy of the work. However, such slight variations in the lengths of the chords are immaterial; the middle ordinates will be affected so little that the difference cannot be measured. In the case of a 6-deg. curve and 39-ft. stations (78-ft. chords), if the ordinates are measured to the nearest ⅛ in. the chord must be 2½ in. longer to increase the ordinates by ⅛ in. For lighter curves the chord would have to be still longer to affect the middle ordinates by as much as ⅛ in.

On the other hand, the *ordinates* must be measured with the greatest care or the results of the work will be affected. If the ordinates are to be measured, or the stakes set, by trackmen, the most practical unit of measurement is the eighth or sixteenth of an inch, as these are the units with which these men are most familiar and are those found on the rules commonly furnished to them. For curves over 2 deg., or for speeds below 60 m.p.h, the eighth of an inch is suitable, but for very light curves and high speeds the sixteenth is preferable.

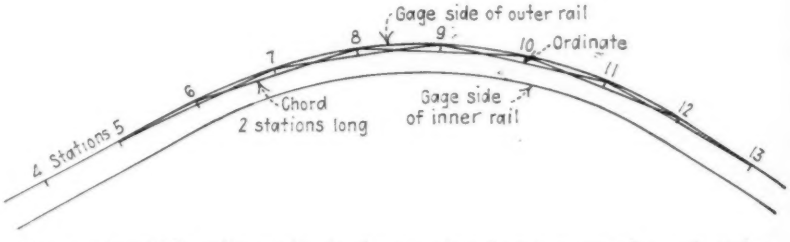


Fig. 2—The middle ordinate of a chord two stations long is measured at each station

The territory with which the writer is most familiar is semi-mountainous, with curves from 4 to 7 deg., mostly limited to speeds of 45 m.p.h. Using measurement of 1/16 in. in such territory would entail unnecessarily large figures in computations. Units of tenths of an inch or hundredths of a foot can be used, but to do so usually would require that the engineer return to set the stakes or convert each throw into eighths or sixteenth for the man who does set them.

The stringmen should hold the string firmly against the low point of curve wear on the rail head and watch to see that it is straight

If a recorder is present he should check the reading of the rule carefully to insure the accuracy of the original measurements

The stations should start about five rail lengths ahead of the beginning of the existing curve and extend about the same distance beyond the end of the curve as found, because usually the spirals will have to be lengthened, and half of the additional length will be along the existing tangents. Also, frequently there is a "dog-leg" in the tangent, which should be measured and allowed for in the correction. If the kink is in the same direction as the curve, it should be measured and recorded exactly as any other ordinate, but if it is in the opposite direction it should be measured with an offset string and recorded with a minus sign (—) before it. This will cause it to be corrected in the solution, and the track made tangent up to the point of the spiral.

On single track the stations should be numbered in the same direction as the mile posts, or station numbers, to correspond with the stations on the valuation maps. This will avoid a great deal of confusion when entering the data on these maps. On multiple tracks the writer has found it advisable to number the stations with the current of traffic on each track.

It has been noticed that trains leave a curve through the final spiral much easier than they enter a spiral, so the entering spiral is adjusted more carefully and any slight excess or deficiency in alinement is eliminated at or near the final spiral. The important thing, however, is to keep the notes taken on the ground in such manner that the computer can be sure just which way the stations were numbered. This is especially true when the computer is not the man recording the notes.

Two men hold the string against the gage side of the head of the rail, at the bottom of the curve-worn portion, at two stations, while the third man measures the ordinate at the station half way between them. If a recorder is present, he should check the reading on the rule also, as too much care cannot be taken in getting the original measurements correct. An error in reading the ordinate cannot be detected by the computer during computations, but it will be reflected in the final alinement, which will be found by trains, with the result that the track will be knocked out of line again quickly. It will cause a sharp or flat place in the curve, two stations long, which will be out of line in the middle by twice the error in reading.

Stretching the String

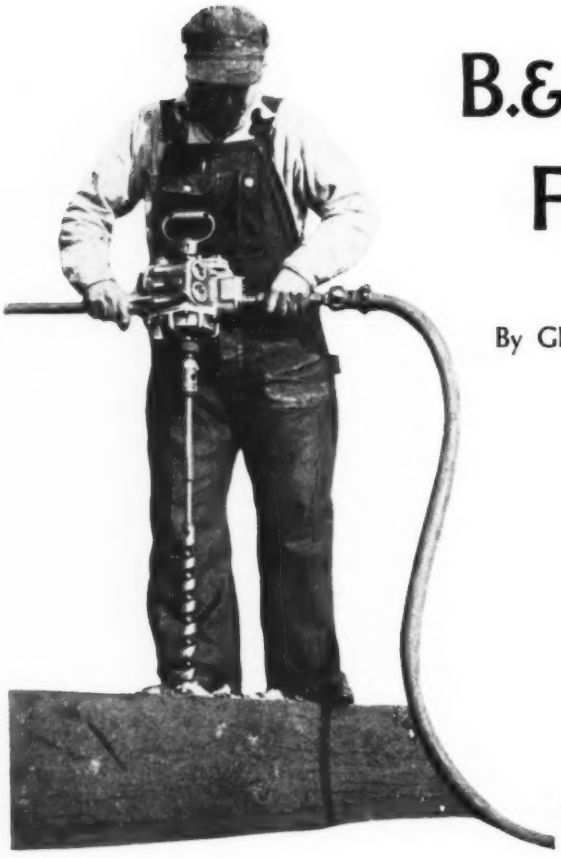
The string should be stretched tightly, but without force enough to break it, and the side of the string next to the rail should always be read, not the center of the string.

The stringmen should keep their thumbs on the exact string length used as chords while moving to the next stations, so that any variation in length between stations may be noticed, particularly if rail lengths are being used as stations. If variations are encountered, a tape must be used to locate the remainder of the stations on the curve. No short stations can be tolerated; they must be kept within an inch of uniform length in order to produce satisfactory results.

The string should be kept at uniform tension and free from any contact with grass or weeds. The stringmen must watch to see that it is straight from end to end when the measurement is being taken, as the measurer or recorder at the middle of the string cannot tell if there is a kink in it. He can tell if the proper tension is being maintained, however, by plucking the string upward after it has come to rest upon his rule, and then checking his reading. When the wind is blowing across the track, he may have to so pluck the string two or three times at each station before he is sure he has the correct reading.

He should hold the end of his rule against the bottom of the curve-worn portion of the head of the rail, the same as where the string is held. This is necessary because the tacks for the revised alinement are to be set later by measurement from the same point. Accuracy of measurement of the original ordinates is essential to obtain a true curve in the re-alinement stakes.

As soon as he has made his reading, the measuring man should so indicate by signal, so that all may move to the next station together. This is repeated, one station (half the chord length) at a time, until a point five or six stations beyond the end of the curve is reached. With the exception of measuring along the tangents a few stations, and the using of rail lengths (instead of 31 ft.), this part of the work is done exactly as the practical trackman would do it, and there are always men in the gang who know how to hold the string.



B.&B. Gangs *Must* Be Fully Mechanized

By GENERAL BRIDGE AND BUILDING SUPERVISOR

This article is based on a letter received recently in answer to a request, sent to a number of bridge and building supervisory officers, for expressions of opinion regarding the mechanization of bridge and building work. It includes a recommended list of power tools for an eight-man gang, a discussion of the savings and other advantages to be expected from mechanization of this work, and some comments on the effect of high labor costs on the need for more machines.

Wood borers are high on the list of essential tools for B. & B. gangs

IN MAKING a study of the mechanization of the bridge and building forces on a particular railroad we must first establish a premise as to the number and types of small power tools and machines that should be furnished a particular gang so that the assigned work can be handled efficiently and expeditiously. Mechanization of the gang will not only increase the efficiency, with resulting savings in man-hours, but will also give the men a feeling of greater satisfaction with their work. We have found that there is definitely less labor turnover in a mechanized gang as against a "bull" gang, i.e., one in which all work is accomplished with the sweat of the brow and the strength of the back.

Equipping an Eight-Man Gang

Given below is a list of the power tools and machines which I consider are necessary fully to equip an eight-man bridge gang working on timber structures. A crew of this size may be considered quite small by some but the relative efficiency of such a gang, when mechanized, as compared with a larger "bull" gang, has proved to be astounding. It must be definitely stated that a partially-equipped gang is not a mechanized gang. Lack of several essential tools greatly decreases the total output. Recommended power-tools necessary fully to equip an eight-man gang are as follows:

Transportation—If at all possible, a 1½-ton truck should be furnished. Supplementing this, a motor car should be assigned to the gang to reach points not accessible by truck and to handle materials and equipment on the job.

Power Plant—A 60-cu.ft. compressor with starter has proved the most satisfactory on our jobs. When a chain saw is used, the size of the plant must be increased to 115 cu. ft., or air may be obtained from a pile driver or work train. We have also used electric generators and have found that a 2½-kw. unit is the most satisfactory.

Small Power Tools—Of first importance are two pneumatic wood borers. The lightness of this tool is of particular importance to men working on staging. Wood borers must be reversible. Other desirable tools include two pneumatic impact wrenches, a pneumatic spike driver, an air saw of the hand-held type, and a chain saw. The latter tool requires 80-100 cu. ft. of air per minute. It would be helpful if a chain saw with a lower air consumption were to become available. Another desirable unit is an electric plant for emergency lighting. A 1½-kw. unit will provide illumination on small jobs, and may also be used for supplementary wood boring operations.

Push-Car Crane—This machine is essential for heavy lifting and should be powered by an air hoist. The push-car cranes used by our gangs are company-built, fully-revolving units with crane boom offset, leaving out-rigger beams extending in front to carry stringer loads. The air hoist is mounted on the crane and handles heavy loads quickly. This crane is excellent for removing and replacing ties on open-deck bridges. The air compressor is mounted on a separate push car, and a motor car is used to move both units.

In my opinion these power tools and units of equipment are needed to mechanize a bridge gang working on timber structures. Obviously, changes must be made for other types of work, such as the use of concrete mixers on concrete jobs and various tools for steel bridges. New concrete mixers on many railroads are at present needed only for the replacement of worn-out equipment as the use of ready-mixed concrete in yards and shops has increased and released many mixers for road jobs. Concrete jobs require the

use of air vibrators for good results.

The mechanized gang of eight workmen should have available all the fore-mentioned equipment, and at all times. It is not satisfactory to have a scattering of tools on a division in various gangs and to assemble them on particular jobs. The men should use these tools regularly to become experienced in their use.

Economy in Mechanization

At the start of World War II manpower shortages developed on the railroads. On a particular division the writer had a bridge and building supervisor who was power-tool conscious. He rented, borrowed or purchased air tools and built push-car cranes. Today his gangs are 75 per cent equipped. I have closely checked his costs, the size of his gangs, and the time expended on job construction. Mechanization showed definite savings of 20 to 30 per cent as compared with hand labor jobs. Consequently, although gangs were reduced from 12 to 8 men, they were able to accomplish the same work in the same time.

At present wage rates cash savings due to this mechanization, comparing an 8-man mechanized gang with a 12-man gang using hand tools, is roughly $12,000 per year. The cost of this standard equipment is now in the neighborhood of $4,500, not including the truck and the motor car. It would appear that railroad managements would rush to purchase the needed equipment to bring about such savings, even if these savings were only one-half of the amount stated. The economy is there, but it is often an uphill struggle to make progress in obtaining more equipment.

Summary of Advantages

To summarize, it has been my experience that the value of small power tools for bridge and building work lies in the fact that a fully-mechanized gang: (a) Can reduce labor costs from 20 to 30 per cent; (b) will have less labor turnover, as the men will be better satisfied in the performance of their work; (c) can employ fewer skilled carpenters and still do a satisfactory job; and (d) can reduce train delays as work can be completed in a shorter period of time, especially when such gangs are restricted in the use of slow orders.

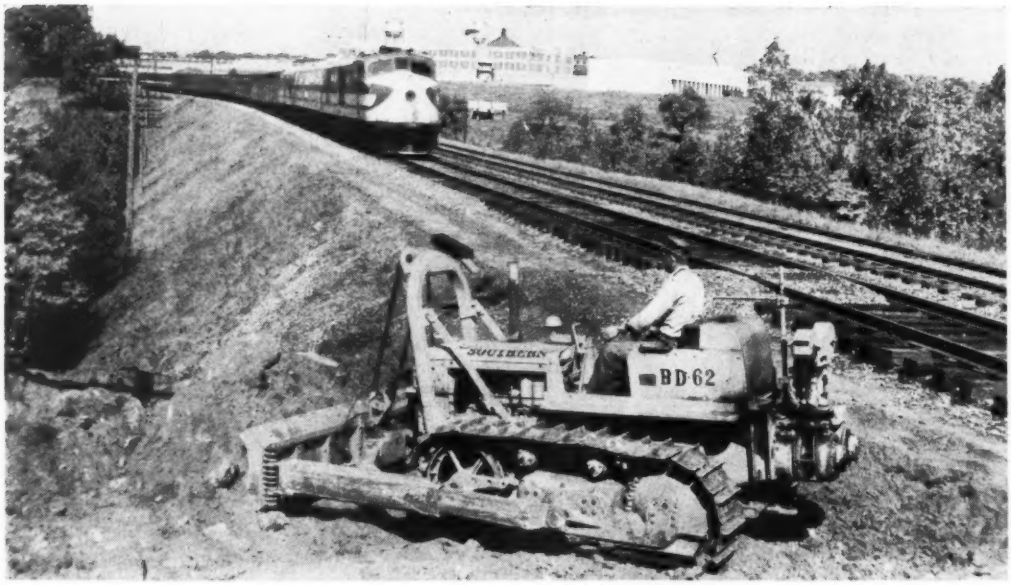
Examples may be cited to show the economies or advantages resulting from the use of power tools. For instance, one division on my district has shown conclusively that power tools resulted in average savings in labor of 25 per cent on timber-trestle jobs. Also the use of air borers on such projects indicates that one man using this small tool will drill as many holes as four men using hand augers.

On my road there is need for additional small power tools for the use of the bridge and building forces. For example, there is a large demand for small power tools to mechanize fully gangs engaged in work on timber trestles and tunnels. Making a spot check on 55 gangs, which is approximately 50 per cent of the total gangs on the system, I found only 16 gangs adequately equipped for this type of work.

In addition to saving labor small power tools reduce labor turnover and mimimize train delays. These views show an impact wrench and a chain saw in operation

Types of equipment in particular demand are those tools listed above for an eight-man gang. The first item needed is the power plant. When this main expense has been incurred, the expenditures for small power tools are relatively minor. Each power tool that is obtained results in increased efficiency for the gang.

Higher labor costs have a very definite effect on the need for increased mechanization of the bridge and building forces. Wages have increased more than 50 per cent over the rates of pay in effect in 1939, effecting all maintenance and construction costs relative to bridges and buildings. If we assume that labor costs are roughly 50 per cent of the total cost, the overall costs of such work have increased 25 per cent, exclusive of increases in prices for materials.



Diesel-powered bulldozer tractors are widely used in maintenance-of-way work. Often the working conditions are exceedingly dirty. Keeping this dirt from entering the engine is a vital maintenance function

Dirt-Free Diesel Operation

The dry season is here in most parts of the country, and with it increased need for protecting internal combustion engines, including Diesels, from the damaging effects of dust and dirt. Since railroad maintenance departments are using an increasing number of machines powered by Diesel engines the problem of assuring efficient operation of these units is one of vital interest to them. In this article Mr. Black discusses the precautions that should be taken to minimize damage to Diesels due to dirt and moisture.

By W. W. BLACK
Manager, Service and Parts Department
Industrial Power Division
International Harvester Company

THE IMPORTANCE of keeping dirt and moisture from entering the working parts of a Diesel engine cannot be overstressed. Ninety-nine cases out of each 100 involving excessive engine wear are caused by abrasion. This abrasion usually results from dirt carried into the engine through the fuel system, by the lubricating oil, or which finds entry through defective engine gaskets and seals. While Diesel engines are equipped with fuel filters, oil filters and air cleaners, all highly efficient under normal operating conditions, such units have definite limitations, especially where Diesel engines are called upon to operate under extremely dirty conditions.

The more important steps in a maintenance program to keep dirt and moisture from entering the engine are: (1) Selection of the proper fuel from a reliable dealer, and the provision of fuel-storage facilities designed to avoid contamination; (2) frequent inspection of fuel filters and filter elements; (3) elimination of entrapped dirt during fuel-system overhaul; (4) frequent inspection of oil filters and oil-filter elements; (5) maintenance of a clean oil bath in the air cleaner; and (6) frequent inspection of all engine and accessory gaskets and seals.

Fuel System Cleanliness

The fuel system is the heart of a Diesel engine. Dirt or water in the system will not only reduce the immediate power output of the engine but will eventually cause excessive wear of the high-precision fuel-system components. This wear may be due to abrasion (caused by dirt), or to corrosion (caused by entrapped moisture or chemical impurities in the fuel).

Precautions in the purchasing, storing and handling of Diesel fuels will eliminate many trouble sources right at the start. Make certain that the right grade of clean fuel is delivered into the storage tank or barrels. Storage facilities should be shaded from the sun to avoid heat which causes gum formations, and each tank or barrel should contain a water and sediment trap for dirt and for water resulting from internal condensation.

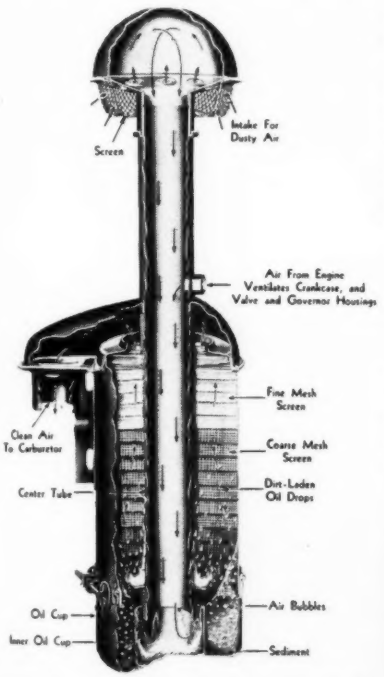
Each time the engine is stopped for a prolonged period the fuel tank of the Diesel engine should be filled immediately to eliminate moisture-filled air space above the fuel supply and prevent condensation of this moisture during atmospheric temperature changes. Any water traps located in the engine fuel system should be checked and cleaned daily, or oftener if required.

Each time the fuel supply runs low the fuel system should be vented to make sure that air does not enter it. The system must be filled with solid fuel at all times. Check all fuel-filter elements frequently. Filter elements

clogged with wax, dirt or other foreign matter are the most common cause of erratic engine operation and loss of power.

Injection nozzles should be checked at least once every six months for cleanliness and opening pressure. A partially clogged nozzle orifice will cause erratic engine operation and loss of power. Make certain that the scavenging valve of the fuel-injection pump is functioning properly. This valve may become stuck due to dirt or corrosion.

When it is necessary to disassemble



Cut-away view of International Diesel air cleaner. The oil bath should be changed often. Gaskets and seals must be kept tight to prevent leakage of unfiltered air

and reassemble the fuel-injection pump, do it in a clean, dust-free room. Never disassemble the pump outdoors. The close tolerance of the parts may be destroyed by inclusion of a single piece of grit during reassembly. Wash all parts thoroughly in clean fuel oil just prior to reassembly.

The Lubrication System

The lubrication system in a Diesel engine serves two distinct functions—it supplies a lubricant for reducing friction between moving parts and, just as important, it flushes away abrasive dirt and microscopic metal particles produced by normal wear. The dirt and metal particles are removed from the lubricant either by the oil filters, or by a settling process which produces sludge in the lower portions of the oil reservoir (usually the crankcase).

Maintaining cleanliness in the lubricating system demands first of all clean, wax-free lubricating oil. Purchase such oil from a reliable source and keep it in clean, closed oil containers until ready for use. Use only clean containers when replenishing the engine oil supply. Inspect oil-filter elements frequently for signs of clogging and wax accumulations. Do not prolong the use of dirty filter elements.

Another source of lubricating oil contamination is through the crankcase breather. Quite often visual inspection of the screen in the breather will indicate this condition. A better check, however, is to use a U-tube filled with water and connected to the breather orifice. Action of the water in the U-tube with the engine operating will indicate whether crankcase suction or pressure is developing. Slight crankcase pressure is desirable, but suction is not permissible.

Clean Air a Necessity

If unfiltered air were allowed to enter a Diesel engine, carrying with it considerable atmospheric dirt, completely worn-out piston rings and cylinder walls would result in 55 to 65 operating hours! Therefore, inspection of the air cleaner and maintenance of its proper operation are vital factors in engine life.

Air enters the cleaner through an oil bath and swirls upward toward the cleaner outlet carrying minute particles of oil with it. These droplets are caught by a wire mesh screen through which the air must pass and are then returned by gravity to the oil cup. The oil in the bath must be thin enough to allow free passage of the air through it. Use only clean engine oil of the proper viscosity when replacing or replenishing the oil bath. The use of crankcase drainings for this purpose should be discouraged. The best practice is to use new oil for initial filling of the oil bath container, then pour off and save the top portion of this oil when cleaning the cleaner. The sediment remaining in the bottom of the cup may be discarded. Thus only enough new oil to replenish that thrown away is required.

Inspect Air-Filter Gaskets

During dry seasons or when operating in arid territories, the air-filter gaskets may shrink sufficiently to allow unfiltered air to enter the system. These gaskets should, therefore, be inspected frequently. Keep all hose connections between the air cleaner and engine tight, and inspect all air lines for excessive wear or holes caused by vibration and chafing.

Occasionally, despite air cleaner and breather checks, it will be obvious that excessive dirt is finding its way into the engine. This is usually due to defective engine gaskets and seals. When such a condition is suspected, replacement of the gasket or seal should be made immediately.

Stock piling coal with a Diesel bulldozer. A defective air cleaner, allowing coal dust to enter the engine, would cause rapid wear of pistons, piston rings and cylinders

The economy and dependability of Diesel engines has been proved, but, as with all types of engines, complete utilization of these desirable features is accomplished only in conjunction with a preventive maintenance program carried out in a manner to keep the engines in finest operating condition at all times. Internal engine cleanliness is a vital part of this program.

Sand "Shots" Cure "Ailing" Roadbeds

(*Continued from page* 805)

tioned each crater required from 5.0 to 7.7 cu. ft. of sand to fill it. Other locations have required as much as an average of 14 cu. ft. per crater.

Before the stabilization work was done at Mile Post 47, the water table was only 12 in. below the center ditch and shoulder. Tests made by the laboratory of the Federal Department of Highways after the blasting work was completed indicated that the water level had been lowered seven feet. During wet seasons of the year the track at this location previously had to be smoothed once or twice each week. Records show that five carloads of ballast were applied at this location during 1946 to keep the track filled up. Since the stabilization work was performed, there has been no further need for surfacing by the section forces.

The cost of the stabilizing work has varied at different locations according to the depth of treatment, the extent of the area affected, the availability of sand, etc. However, at the first five locations (see table) 2,867 lin. ft. of track were treated at an average cost of $1.68 per track foot.

Quantities and Cost of Sand-Blasting Operations

	Mile Post Location of Work					
	74	76.85	76	76.01	47	Total
Length—ft.	523	126	407	206	1,605	2,867
Holes drilled	260	103	186	230	1,257	2,033
Sand used—cu. yd.	60	27	68	72	409	719

Labor cost	$3,496.11
Labor cost per track-foot	1.22
Sand cost per track-foot	0.31
Fuel and supplies, cost per track-foot	0.03
Dynamite	0.12
Total cost per track-foot	$1.68

To the extent that the limited period it has been under test will permit conclusions to be drawn, this type of roadbed stabilization has proved effective in dealing with the conditions found on the Washington division. Whether it would be as effective as other methods for treating different subgrade conditions is not known. Nor has its use yet been sufficiently widespread to indicate under what circumstances this method should be used in preference to cement grouting or the use of sand piles, although to date the Southern has treated approximately 17,000 lin. ft. of track by the blasting-and-sanding method.

All installations by this method have been made under the general direction of J. B. Akers, chief engineer system, G. L. Sitton, assistant chief engineer system, and E. Bennett, chief engineer, maintenance of way and structures, Eastern lines, following a suggestion made by Superintendent C. K. Carter. The field work has been under the direct supervision of R. L. Fox, division engineer. [Part II of this article will appear in an early issue.—Editor]

Tamping Machine from Switzerland

RECENTLY brought to this country from Switzerland is a tamping machine of the large on-track type which is expected to be in use on a number of roads during the present working season. A second machine, now en route, will soon be available. The units are being introduced by the Matisa Equipment Corporation, New York.

In these machines, which are self-propelled units, each consists of a welded steel frame on four flanged wheels, mounting two tamping mechanisms, one over each rail. There are eight tamping tools at each rail, arranged in two opposing banks of four each in such a manner that two tools of each bank are outside the rail and two are inside. In the tamping operation all eight tamping tools at each rail are dropped simultaneously into the ballast under air pressure, and the opposing banks are then forced toward each other by two screws, compacting the ballast under the tie. During this operation a high-frequency vibratory motion is imparted to the tamping tools.

The machine is operated by one man who manipulates separate controls for the tamping tools at each rail. Power is furnished by a Ford V-8 engine and an Ingersoll-Rand compressor. It is claimed that the machine will tamp 350 to 500 ft. of track per hour. The accompanying pictures of the unit in operation were taken on the Illinois Central.

Above—The Matisa tamping machine. The operator (barely visible) occupies a position between the two tamping mechanisms. Right—Close-up of the four outside tamping tools at one rail. In the tamping operation the tools, after penetrating the ballast, are forced toward each other by the chain-driven screw, while vibrating at a high rate

How To Get Better Concrete—

Curing and Protection

In this, the last in this series of five articles, the author discusses the final phases in the production of good concrete, and gives many practical suggestions for proper curing and protection in both cold and hot weather. In conclusion, he points out that there is nothing complicated in the production of good concrete, which, he says, can be secured under almost any weather conditions by following a few basic principles and the exercise of common sense.

A housing of tarpaulins over wood frames provides good protection in cold weather construction. The enclosure may be heated by salamanders or other means when necessary

No. V of a Series

By A. J. BOASE
Manager, Structural Bureau
Portland Cement Association

IT IS often said that the step in concrete production that does most to build up the potential quality of concrete at the least cost is proper curing. From the time it is placed, water is lost from the concrete. While nearly all concrete in the early stages has more than enough water to complete the hydration process, losses due to evaporation and other causes may reduce the moisture to the point where the hydration cannot continue, or at least to where its rate will be greatly reduced.

Loss of water from the concrete is accompanied by shrinkage. When moisture is lost rapidly from the surfaces of the concrete while the interior mass is still wet, the surface shrinks faster than the interior and this may cause crazing or cracking of the surface. Atmospheric conditions, such as temperature, humidity and wind velocity, all affect the rate of evaporation, as does the surface area of the concrete as compared to its volume.

Methods of Curing

Many methods are available for curing. Coverings of burlap, cotton or felt mats, sand, hay, straw, sawdust, or any other material that will hold moisture and not injure the concrete, can be used. Paper or impervious membranes which seal the moisture in the concrete are also effective. Sprinkling and flooding with water are other methods commonly used.

To get the most good out of curing it is necessary to observe a few precautions. We have all seen cement finishers working in the hot sun and the concrete left exposed to the sun for many hours after finishing. Better results would be obtained if the work were shaded in hot, sunny weather and, in any event, the coverings should be placed as quickly as possible. Of course, sufficient time should be allowed so that the surfaces will not be marred. Absorptive materials, such as burlap or cotton, should be moist enough when placed so they will not absorb moisture from the concrete, and after they have been placed they should be kept wet continuously. Burlap and similar materials waving in the wind dry out rapidly and afford little protection to the concrete. They should be tied down firmly so they will remain in actual contact with the concrete.

Paper-Membranes-Sprinklers

If paper is used for curing, it should be of the waterproof variety, preferably reinforced with fiber, and heavy enough so that it will not tear. It should be overlapped and sealed with glued tape at the seams and weighted down sufficiently to prevent its displacement. One advantage of paper on floors is the protection it affords against injury to the floor finish during subsequent construction activities.

Curing membranes have been developed in both colorless and black. On some jobs, particularly in hot sunny weather, the black membrane is coated with whitewash to prevent undue temperature variations in the concrete caused by the absorption of light rays. The value of a membrane will depend on its ability to retain water in the concrete and its efficiency in this respect can be tested by method C-156 adopted by the American Society for Testing Materials. Membranes are best applied by spray in not less than two coats. The application should be made as soon as possible after finishing unformed surfaces. On formed surfaces the concrete should be wetted thoroughly after removing the forms and then the membrane applied as soon as the surface water has disappeared. Where it is necessary to delay the application of membrane the concrete must be kept moist by other methods in the meantime.

Alternate wetting and drying of green concrete may produce surface crazing, which sometimes develops into pronounced and unsightly cracking. On large jobs, one man assigned to sprinkling cannot cover the entire job fast enough in hot weather to keep the concrete constantly wet. By

This bridge deck was housed during construction to protect the concrete from freezing

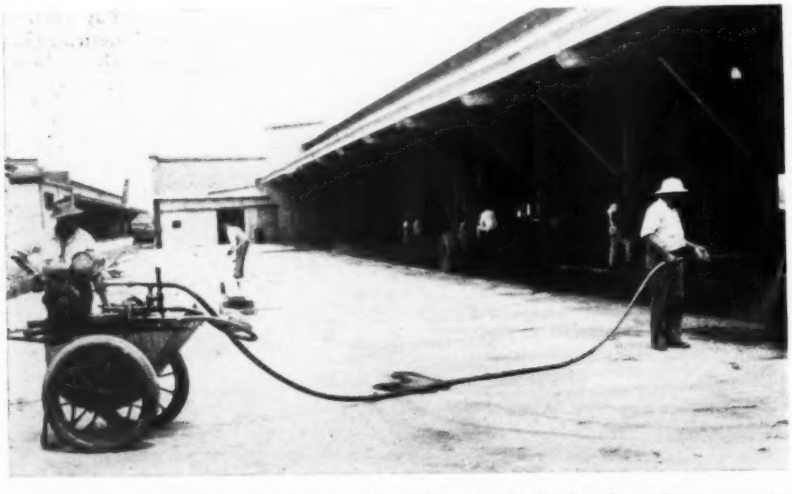
the time he gets around to where he started, the concrete at that point has dried out. This intermittent sprinkling is not good practice. Automatic sprinklers in continuous operation keep the concrete constantly wet and are better than hand sprinkling. Ponding methods, which keep the concrete covered with water, also are satisfactory.

As to how long concrete should be kept wet, much depends on the weather and other circumstances, but three to five days under average conditions is a reasonable period. In hot, dry weather, and for thin sections with large surface areas, some form of protection which permits gradual drying after the wet curing period may be of assistance in reducing the possibilty of cracking.

Cold Weather Precautions

There was a time when out-door construction operations stopped when cold weather arrived. This is not true today and, while certain special precautions are necessary, there is no reason why just as good results should not be obtained from concrete construction in winter as in other seasons. If fresh concrete freezes, or for that matter if it freezes at the early ages, the free water within the mass forms ice crystals. When these thaw later on they leave a system of large pores so that the concrete will be neither watertight nor weather resistant, although it may have more than ample strength for the imposed loads. Depending on the weather conditions then, it may be necessary to heat the materials and protect the concrete after it has been placed to prevent freezing.

Water is easier to heat and carries more heat units than aggregates. In relatively mild weather, therefore, heating only the water and covering the concrete soon after it is placed may be sufficient for proper hardening. It is well to avoid water temperatures above 165-170 deg. F., however, as hotter water coming in contact with the cement may cause such rapid setting that the concrete cannot be placed and finished properly. Aggregates should be free of frost and, of course, in the colder weather it will be necessary to heat them as well as the water so that the fresh concrete will have a temperature of 50 to 70 deg. F. It is desirable to have temperatures near 70 deg. F. for slab work and the thinner reinforced members. Lower placing temperatures can be used in the heavier sections but a minimum of about 50 deg. F. is generally required. Aside from the waste involved, overheating the fresh concrete should be avoided as generally the strength will be lowered. A maximum of about 80 deg. F. is recommended.



In constructing the floors and driveways for this railroad wharf and warehouse, a membrane curing compound was used to retain the moisture in the concrete. The membrane was applied as soon as the concrete could be walked on without marring the surface

Enclosures

Just what form of protection should be provided and how long it should be maintained will again depend on circumstances. A minimum of three days above 70 deg. or five days above 50 deg. is usually required when the air temperature is at or near freezing. In colder weather, longer periods of protection are desirable. Wood forms and covers of tarpaulins, straw and tarpaulins, or other insulating materials, are often sufficient protection in the fall and spring months, but when the outdoor temperature is much below freezing it will be necessary to provide an enclosure that can be heated. In buildings and similar construction particular attention must be given to prevent freezing of the outside members, that is, the concrete near the walls of the enclosure. Enough space should be allowed between the forms and the enclosure to permit free circulation of air and a sufficient number of heating devices of ample size must be placed near the outer edges of the housing to maintain the necessary temperature in all parts of the enclosure. Live steam is especially effective because it provides both heat and moisture. With other methods of heating, rapid drying of the concrete should be avoided.

The time of protection required in cold weather can be cut down by using high-early-strength concrete. Such concrete also permits earlier stripping and re-use of forms in any season. It can be produced by using high-early-strength portland cement or richer mixes of normal portland cement. Further increases in early strength are obtained by the addition of not more than 2 lb. of calcium chloride per sack of cement to the mix. This acts as an accelerator, causing quicker setting and hardening, but precaution in its use in connection with heated materials is necessary to avoid such rapid setting that the concrete cannot be handled properly.

The strengths obtained with normal portland cement at 3, 7 and 28 days are attained at approximately 1, 3 and 7 days, respectively, when using high-early-strength cement. Adding 2 lb. of calcium chloride to normal portland cement mixtures more than doubles the 1-day strength, increases 3-day strengths 60 per cent or more, and the 7-day strengths 30 per cent or more. At ages later than 28 days the calcium chloride has little, if any, effect on strength. Larger amounts of calcium chloride usually lower strengths and, as stated previously, may cause too rapid setting. The calcium chloride crystals should be kept from contact with the cement until the materials are in the mixer, either by placing the crystals with the aggregates in the mixer skip or by dissolving them and using the solution as part of the mixing water.

There is some danger of cracking if the warm concrete is subjected suddenly to very low temperatures. As a precaution against this possibility it is advisable in cold weather construction to leave the protective covers in place for 24 hr. or more after the heating is discontinued.

Hot Weather Precautions

When concreting is to be done in extremely hot weather some extra precautions are necessary to prevent too high a temperature in the fresh concrete and the possibility of cracking upon subsequent cooling. Cool mixing water and cooled aggregates will provide lower temperature. Water supply lines and tanks may be insulated, or at least they can be painted white to reduce absorption of heat. In long supply lines the water may be cooled by covering the pipes with burlap kept constantly moist. Sprinkling the aggregate with cold water is helpful. The lower temperature of the water and the evaporation of moisture from the aggregate bring down its temperature.

More attention must be given subgrades and forms to see that they do not withdraw so much water from the concrete during setting of the cement that the concrete cannot be finished properly. Subgrades may be saturated, and forms may be wetted, oiled or lacquered. Shading the work from the sun, covering with tarpaulins supported on falsework as soon as this can be done, and early wet curing are also important in hot weather.

In concluding this series of articles it is hoped the reader has not developed the impression that the production of strong, water-tight, durable concrete is a complicated affair. It is nothing of the sort, but is a relatively simple process involving a few basic principles and the application of good common sense. It is true, of course, that the construction superintendent or foreman must be ever on the alert to avoid procedures that will give unsatisfactory results, but this should be a challenge to his pride in workmanship and bring the satisfaction of a job well done. Even the demand for rapid prosecution of the work should not deter him from producing defective-free, durable concrete structures, since speed of construction is aided by a properly designed mix and equipment that will provide a steady supply of uniform, non-segregating concrete.

While large expenditures are being made in research work and production facilities to further improve the qualities of concrete ingredients and to advance our knowledge of concrete making, they avail us little if full advantage is not taken of the materials and knowledge now available. If such well-known causes of defective concrete as improper construction procedures and aggregates of doubtful quality were eliminated, there would be few structures indeed which would not come up fully to our expectations.

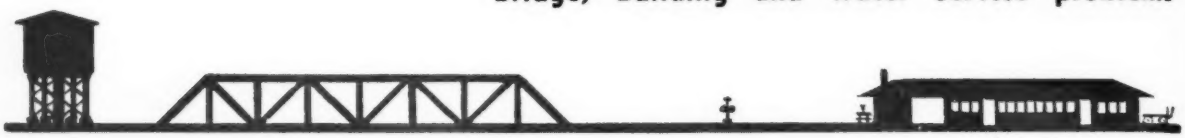
Precast concrete piles cured by covering them with cotton mats kept wet by sprinkling

Replaces Large Trestle With Fill

AN UNUSUALLY large trestle-elimination project is one carried out recently near Rockton, Ore., on the Spokane, Portland and Seattle, in which a timber trestle, 120 ft. high and 1,185 ft. long was replaced by a 12 ft. by 12 ft. concrete box culvert and an earth fill over the culvert. More than 700,000 cu. yd. of filling material was required on this project which cost approximately $338,000. Shown above is a Caterpillar D-8 Diesel tractor, equipped with rear cable control and bulldozer blade, pushing a load of fill material into position during an early phase of the work.

WHAT'S THE ANSWER?

An open forum for maintenance men on track, bridge, building and water service problems



Installing Bootleg Connections

Where new rail is laid and it is impracticable to have the new locations of the insulated joints fall within the limits of present bootleg connections, what is the most effective means of relocating the bootlegs with the least disturbance to signal wires and to the track structure? Explain.

Proposes Longer Ties

By W. M. S. Dunn
General Roadmaster, Nickel Plate, Cleveland, Ohio

It has been our practice, when it is impractical to have the new locations of the insulated joints fall within the limits of the present bootleg connections, to make temporary connections from the existing bootlegs by extending the wires. This, of course, is a temporary installation, and as soon as practicable the bootlegs are dug up, the wires removed and new installations made in proper relation to the new location of the insulated joints.

It is very rare that the track structure is materially involved other than the changing of the locations of the joints and cut sections. This of course requires careful tamping and surfacing where the old locations were changed. It is my opinion that on most railroads the insulated joint is the "orphan" in track maintenance. In other words, I am inclined to believe that we are lax in our maintenance of insulated joints. The need for more maintenance may be due possibly to the design of the abrasion plate and the fact that ordinary 8½-ft. track ties are used under these joints. To meet this need it might be advisable and economical to go to a longer tie under insulated joints and have a thicker and longer abrasion plate.

Why Not Use Power Augers?

By Assistant Supervisor

Every time the locations of insulated joints are changed for any cause, the bootlegs must also be changed. On multiple-track territory the moving of bootlegs invariably requires that a ditch or two be dug across a track and several ditches dug between the tracks. Each of those ditches dug across a track, regardless of how well it may be back filled, remains for months weaker than other portions of the roadbed. Consequently, it requires an abnormal amount of work to maintain the track surface to a standard comparable to the rest of the track.

Therefore, it behooves us to do all that we can to keep from digging these troublesome cable and bootleg trenches. The first solution, of course, is to plan our rail laying in advance and in such a manner that the number of changes that have to be made at insulated-joint locations are reduced to the minimum, and that those that cannot be avoided are moved as little as possible.

In these unavoidable cases we might well make use of one of the new drilling machines designed primarily for drilling holes for telephone cables, water lines, etc., under highway pavements. To use such a machine we would only have to dig a hole several feet square outside of or between the tracks to a depth slightly below the level at which we wish to carry our cable under the track. A gasoline powered auger would do the rest. There is one on the market that is said to be able to drill a 4½-in. hole to a distance of 50 ft. or more. How well it might work in rock ballast is not known, but I am sure the unit could be given

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Answers to the following questions are solicited from readers. They should be addressed to the What's the Answer editor, *Railway Engineering and Maintenance*, 105 W. Adams St., Chicago 3, and reach him at least 30 days in advance of the issue in which they are to appear. An honorarium will be given for each published answer on the basis of its substance and length. Answers will appear with or without the name and title of the author, as may be requested. The editor will also welcome any questions which you may wish to have discussed.

To Be Answered In the October Issue

1. *Where turnouts have been standardized, is it practicable to store at storehouses stock rails already bent and drilled? Explain. Would the location of use—main track or yards—affect the practicability?*

2. *What are the requirements of an effective conduit system for insulating underground piping? Explain. How should such a system differ for pipes carrying steam, hot water or oil? Why?*

3. *For what specific railway uses are prefabricated buildings adapted? What are their advantages? Their limitations?*

4. *What are the most effective methods of ventilating Diesel locomotive maintenance and heavy-repair shops? Do different areas require different treatment? Explain.*

5. *Is it practical or feasible to provide remote control for electric or gas switch heaters? Under what conditions? How can this be done?*

6. *What are effective means of protecting the flanges of the stringers and floorbeams of open-deck steel bridges from corrosion due to brine drippings? Explain.*

7. *Can loudspeakers be used effectively at train accidents or other emergencies? If so, how should they be used and for what specific purposes? Explain.*

some kind of attachment that would work.

If such a machine were found to be feasible, bootleg locations could be considered so flexible that the numbers of unwanted short rails could be kept to the minimum and the standard of maintenance to the maximum.

Fire Protection for Camp Cars

How can camp cars be effectively protected against the origin and spread of fire? Explain. Who shares in this responsibility?

Protection Begins in Cars

By A. C. Paynter
Assistant Engineer, Chicago, Milwaukee, St. Paul & Pacific, Chicago

The problem of protecting camp cars against the origin and spread of fire is one that must be started at the time the camps are made ready for extra-gang use. If the cars to be used have been converted from revenue passenger equipment and are not relined, all corners or dark places should be provided with illumination to reduce the tendency to accumulate combustible material into which lighted cigars or cigarettes might be thrown. If the cars are of the box-car type and are relined, the necessity of lighting the dark places is eliminated by cutting windows in the cars. The material used to line camp cars should always be as fire resistant as possible.

All outlets for stove pipes or other hot pipes should be installed inside of jackets or an insulating space. Stoves or other heating units should be so placed and the walls and floors insulated in such a manner as to avoid the starting of fires. This is usually accomplished by combining metal sheeting with asbestos paper in such a way as to provide for an air space between the insulation and main walls and floor. In addition, check dampers and spark arrestors should be provided in all cases in order to keep the sparks and flame within the fire box.

Portable lights, such as wall lamps, should be fixed in a permanent manner so as to avoid displacement when the train is moved. Where camps are electrically lighted, all wiring and fixtures should be made safe and suitable for the current used. Circuits should not be overloaded by switching or changing fuses in order to use as many electrical units as desired. To do so may cause a fire to start elsewhere in the camp. This is a frequent cause of trouble, and foremen should educate their men to leave fuses alone.

All cars should be equipped with fire extinguishers, preferably in the five-gallon size. These should be supplemented by a line of hose which can be used in case the fire cannot be controlled by the extinguishers. This line of hoze should be equipped with a nozzle and be attached to the pump car which is connected with the water cars.

Cars used for the storage of oil should have a covering of clean sand on the floor and this should be changed frequently to avoid saturation of the sand, which might become ignited.

The foreman of the extra gang should instruct all laborers in the camp as to the correct use of fire equipment so there will be no confusion in case it is necessary to use it. In all our camps we have a fire patrolman who tends the fires in the individual cars during the heating season and who also acts as the night watchman. This system guards effectively against overheated stoves and assures warm cars in the morning. As a final precaution it is advisable to maintain water barrels at strategic points for use in the event of failure of the water pump.

Maintaining Track Scales

On what items should the inspection and maintenance of track scales and scale pits be focused? Should such be on a regular schedule? Why? By whom?

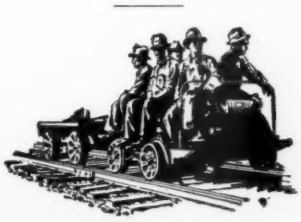
Inspections Made Monthly

By H. Mayer
Supervisor Scales and Work Equipment, Chicago & North Western, Chicago

Inspection of track scales should be made once each month. Such inspection should be made by a regular, assigned man, such as a scale maintainer, division scale inspector, or a carpenter. These men should receive their instructions from the general scale inspector on his regular test of track scales with a scale test car.

The monthly inspection should be in three parts: (1) *Deck and Rail Inspection*—The gaps between the approach rails and the scale rails should be maintained at the minimum distance of ¼ in. and the maximum of ¾ in. Weather strips should be turned back to inspect the clearance between the coping and live deck, and between the dead-rail structure and the live deck on live-deck track scales, and between the live-rail structure and the rigid deck on rigid-deck scales. The minimum clearance distance should be ½ in. and the maximum clearance distance should be 1 in.

Approach and scale ties should be inspected to determine if they are crushing under load. This is best accomplished by watching approach and scale rails while cars are moving on and off of the scale. If excessive deflection is noted, first inspect the scale and approach ties for mechanical wear or deterioration. If ties are in good condition, a pit inspection of the scale may show the cause of excessive deflection to be wear on pivots and bearings, or the stretching or breaking of links, loops, suspensions, or levers.



(2) *Weigh Beam Inspection*—Bearings or bearing loops on the scale weigh beam and shelf lever should be spaced to remove friction between the bearings and beam or shelf lever. The beam should then be balanced in the center of travel. The fractional poise should then be moved forward until the beam is in balance at the bottom of travel. The amount of weight represented by the movement of the fractional poise is called Sensibility Reciprocal, or S. R. The maximum allowable S. R. on grain scales is 50 lb.

The reading face on weigh beams should be cleaned and polished to insure correct reading of the weight indication. Poise rollers and beam notches should be cleaned and oiled. On type-registering weigh beams, scale tickets should be punched at various points to determine if legible weights are printed on them.

(3) *Pit Inspection*—Inspect all levers, pivots, bearings and suspensions for rust, wear, breakage, or loose main levers, making such repairs as are required. It should be ascertained that the tile drain is open, or the sump

pump is operative. Accumulations of cinders and dirt should be cleaned from structural steel and the condition of the steel observed to see if it should be painted to prevent corrosion.

A report should be made showing the results of every inspection and the work that was done at the time of the inspection, and should give recommendations regarding any defects that cannot be corrected by the maintainer.

If a rail or the deck of a track scale is binding, or if a lever or suspension is broken, the scale will weigh a car lighter than the actual weight. The error in weighing might be as high as several thousand pounds, depending upon the severity of the bind and the weight of the car. If an origin weight is taken on such a scale, loss of freight revenue to the railroads results, and if a destination weight is taken, a claim for loss in transit is presented. Therefore, since railroad track scales must reflect correct weights, monthly inspections are an insurance against loss of freight revenue and the reduction of claims for loss in transit.

Cleaned by Section Gang

By Walter Schlinkert
Superintendent of Scales, Illinois Central, Centralia, Ill.

It is and has been the rule and custom of the Illinois Central System for over 60 years that the construction and maintenance of all classes of scale work be handled directly by the engineering department under the supervision of their superintendent of scales, with well-qualified and experienced scale mechanics.

All track scales are inspected and tested with standard testing equipment at regular intervals of three to four months. This has proved to be very satisfactory and I am very proud to state that we maintain all of our scales in the best working condition at all times.

The cleaning of the scale decks and pits is taken care of by the local section foreman at regular intervals or as often as he finds they are in need of attention. This cleaning is covered by printed rules in the maintenance-of-way Book of Rules. Further instructions governing the care and use of track scales are framed and placed in every track scale house where they may be read by everyone concerned. These instructions specify that the foreman should inspect the scale at least once a week and see that the pit and platform are thoroughly cleaned when necessary. They also stipulate that he should see that a space of not less than ¼ in. or more than ¾ in. is maintained between the scale rails and the approach rails.

I feel that all railroad scale construction and maintenance should be supervised by well-trained and experienced scale mechanics and not done by inexperienced bridge men, who do not realize the great importance of proper scale maintenance.

Any scale on a railroad or industry is one of its most important devices. Since most railroad revenue is collected on the basis of weight, correct weights are very essential.

Waterproofing Brick Walls

What effective methods can be used in the design and construction of brick-masonry walls to prevent the infiltration of moisture? To waterproof existing brick walls?

Use Good Brick and Mortar

By James J. Healy
Assistant Supervisor Bridges and Buildings, Boston & Maine, Boston, Mass.

The usual design of brick buildings provides for concrete foundation walls up to a level determined by the architect. Wall thicknesses above this foundation may vary from 12 in. to 21 in., depending upon the height and load design of the structure. Buildings of less modern design are sometimes found with wall thicknesses of 8 to 12 in. Present wage schedules and material costs usually confine the construction of brick buildings to heights of one to three stories, with a minimum wall thickness of 12 in.

In the design of this type of building the specifications should be clearly written and they should be rigidly followed during the progress of construction—particularly the following items: (1) Quality of the brick; (2) mortar mixture; (3) description of bond and size of joints; (4) workmanship; (5) flashings and caulking. Brick used in building construction may be generally classed as common brick and face brick. The latter may be subdivided into various types for artistic treatment, such as tapestry, sand-lime, cement brick, etc. As the result of research work by the American Society for Testing Materials, and tests made by the Bureau of Standards in cooperation with the National Brick Manufacturers' Association, it is possible to obtain bricks conforming to standards of compressive strength, modulus of rupture, and porosity. Briefly, a first quality brick should be regular and true in shape, free from kiln marks and depressions, well burned throughout, fairly uniform in color, and should give a clear ringing sound when struck with a hammer. If first quality brick is used it may be safely assumed that moisture will not penetrate it.

The mortar mixture is determined by the load to be carried. Usually a lime-cement mortar should be specified in preference to a straight cement mortar, although cement mortars with admixtures, producing a greater density and a high degree of workability, have been used to advantage. Constant supervision during the progress of construction is necessary to assure the use of the correct mortar mix at all times. The use of reworked mortar should not be permitted.

For narrow joints, which require a minimum of maintenance, the Common, English and Flemish bonds are desirable, with flush or weather joints. Such joints reduce the possibility of shrinkage, which is more prevalent in wide joints. Grooved, beaded or raked joints, while permitting latitude in architectural design, are more vulnerable to weather and damage from drippings during alternate thawing and freezing temperatures.

First-class workmanship in laying up the walls is a prime requisite in the construction of a watertight building, and the inspector must be alert in checking the bed mortar, uniformity of joint size, finish pointing and cleaning. Window and door lintels, parapet walls, etc., must be properly flashed and particular attention should be given to the pointing of joints receiving metal-cap flashing. Joints around windows and doors should be caulked with an approved waterproof compound.

The metal wall capping should be lock-seamed and soldered where exposed directly to the weather, and, if a decorative capstone is specified, special attention should be given to make sure the metal beneath it is tight and lapped over the base flashing. In certain localities, where walls are exposed to driving storms, it is desirable to apply a damp-proofing compound to the interior face before plaster furring or wire lath are installed. With proper supervision and adherence to the above general specifications a weatherproof brick-masonry building can be obtained.

Existing brick walls, subject to dampness and moisture infiltration,

are a source of annoyance to building occupants and very often result in serious damage to installations and contents. Accordingly, the immediate attention of the responsible maintenance officer is necessary.

A careful inspection of the premises must be made to determine the cause. Frequently it is found that the mortar joints have shrunk or disintegrated or that the caulking around the wall openings has deteriorated. Unless it is obvious that the defective area is well defined, it is good practice to waterproof the entire wall thoroughly. This work should consist of raking all mortar joints to a depth of 1 to 1½ in. and repointing them with cement mortar containing a waterproofing admixture. Remove all old caulking and replace with oakum, allowing approximately ¾ in. from the face. Then apply a patented caulking compound of which there are many good grades on the market.

In recent years the supply industry has developed a colorless waterproofing compound recommended for application to the exterior of brick walls where mortar shrinkage only has appeared without disintegration. In some cases a cement-base paint, colored to suit, has been used with good results.

Plate-Cutting of Bridge Ties

How serious is the plate-cutting of bridge ties? Where this is a problem, how can it be overcome or minimized?

Tie Pads Being Tested

By M. J. Hubbard
General Supervisor of Bridges and Buildings, Chesapeake & Ohio, Richmond, Va.

The plate-cutting of bridge ties has become a costly problem on all heavy-tonnage lines during the past few years. Probably the greatest factor causing this condition is the volume of heavy traffic that has been operating over our bridges.

The weights on the drivers of steam locomotives that have been built during the past few years have been increased considerably, as have the speed of trains. Heavier girders and rail have been installed, but, as a general rule, the area of the bridge tie plate bearing on the tie has not kept pace with the requirements of the increased speed and heavy load impact on bridge ties.

Another factor contributing to the abnormal plate-cutting is the grade of timber used in bridge ties during and since the last war. Bridge timber was very scarce during 1944, 1945 and 1946, causing seasoned bridge-tie stocks to become very low. To take care of maintenance and new construction it was necessary to treat timber that was not thoroughly seasoned. Ties were often shipped direct from the treating cylinder and were carrying traffic over them within a few days. This practice caused much greater plate-cutting on these ties than would have occurred on well seasoned ties.

In recent years, quite a large number of creosote-treated pine ties have been used. Although they have been giving very good service life on tangent track, such ties should not be used on curves under heavy traffic or excessive plate-cutting will result. This will allow track gage to become wide, and, in turn, require a considerable amount of respiking.

The plate-cutting of ties is caused chiefly by the motion of the plates in contact with abrasive materials which grind into the moisture-softened wood on the tops of the ties. To overcome this grinding action, a number of tests are being made of various types of tie pads, ¼ to ⅜ in. thick, which fit between the tie plate and the tie. One of these types is made of layers of cotton duck impregnated with a special rubber, and the other is made of an asphalt compound that seals the tie plate to the tie.

Plate-cutting of bridge ties is also being minimized by the use of larger tie plates to give a greater bearing area. The deterioration of a plate-cut tie is rapid. After the plate has seated itself well into the tie, there is a tendency for water to stand around and under the plate, which causes the wood to stay soft. This allows the water to penetrate the heart of the tie through spike holes.

Many Factors Involved

By C. D. Turley
Engineer Ties and Treatment, Illinois Central, Chicago

Plate-cutting of ties on bridges due to the rigid support provided by bridge structures, becomes a serious maintenance problem and is in almost direct proportion to the density and speed of traffic and the weights of wheel loads.

The type of the bridge structure, the species of wood used for ties, the weight and section of rail, and the size and design of tie plates have much to do with the severity of the plate-cutting of bridge ties. Reduction in the rigidity of the track support, dense and high-strength wood in ties, stiffer rail to distribute the wheel loads over a greater number of ties, and larger and heavier tie plates to provide a greater bearing area and to distribute more equally the load from the rail base, all tend to reduce plate-cutting.

A more recent method for reducing plate-cutting is to anchor the tie plate to the tie by means of screw-spikes equipped with double-coil washers, or by other means, thereby preventing movement between the metal plate and the wood tie, which, if permitted, would result in the mechanical destruction of the wood. Manufactured, composition tie pads now being used and tested also give much promise. These are installed under the tie plates to protect the tie from wear. Since their wear resistance is much greater than wood where they are used, it has not been considered necessary to anchor the plates to the ties.

Threefold Solution

By Lee Spencer
Track Supervisor (Retired), Long Island, Phoenix, Ariz.

Few maintenance of way men realize that the annual cost of a single tie on many bridges exceeds the dividend requirements of a share of stock or the fixed charges of a $100 bond. Once study provides a solution to the premature destruction of these ties, we will know how to increase the service life of all ties in track.

Many engineers will point to the progress we have made in treating ties. True, great progress has been made; during the depression the results of this practice in the form of annual savings just about equalled the industry's net earnings. This should show that protective measures pay big dividends. Today, on many railroads as a whole, and on certain districts and divisions of all railroads, observation will show that these protective measures against decay are being nullified by the abuses of mechanical wear. In some tracks and on some bridges this wear is so rapid that no benefit whatever is obtained from the preservative treatment.

What good does it do simply to replace bridge ties, often at a cost of $30 to $35 each, or crossties at $4 or more each, without taking some constructive measures to increase their

service life above that of the ties or timbers they displaced? There are many instances where a service life of 10 years or less is obtained; yet, in most cases, nothing is being done to correct or eliminate the cause of the original failure.

Brilliant minds in the maintenance-of-way field are devoting their energies to finding ways of reducing the man-hour requirements of doing units of maintenance-of-way work. This is highly commendable, but would not much greater savings accrue to the railroads and stockholders if steps were taken, or had been taken, *to eliminate the necessity* of doing these same units of work?

What steps can be taken to reduce or eliminate mechanical wear of ties? Replacement of the ties under the same conditions that brought about the original failure will not provide a solution. Examining the bottoms of bridge ties ought to be thought-provoking. Many are found to have less area of bearing on the bottom than is provided by the tie plate on the top. Yet, in many instances even the adze and saw-framing marks are still discernible on the bottom bearing, while the top surface has been plate cut enough to cause removal. Somewhere within this observation lies the answer and probably the solution to this important problem.

Some of the answer can be found at switches. The timbers under the switch points, which are generally protected by switch plates of adequate area and length, and are adequately spiked to prevent movement, do not become plate cut to the same extent as timbers in the turnout that are protected only by the common tie plate. Couple this observation with the one concerning the difference between the top and bottom conditions of bridge ties, and certain conclusions can be drawn.

My experience in the maintenance of several miles of steel viaduct under heavy traffic developed that certain steps would practically overcome this type of failure. First, we must have a tie plate of adequate size. My observations indicated that designers of many types of bridge tie plates, although probably right in theory, failed to apply the measures found effective in the field. The most common failure was the assumption that the problem consisted only in designing a plate incorporating a certain area. This point can be developed by comparing the results that were secured with two types of plates. One was 10½ in. by 10 in., or 105 sq. in. in area, and the other was 7½ in. by 14 in., or the same area. On the face of it they should have given equal protection; actually the longer plate was about doubly effective.

Placing these 10 in. wide plates on 10-in. bridge ties did not produce satisfactory results; it seemed that ¾ in. of corner wood on each side of the tie broke off or crushed under rolling loads. The 7½-in. wide by 14-in. plates seemed to center the applied loads without rolling on the tie, eliminating this cutting action. Other tests have shown conclusively that if movement of the tie plate on the surface of the tie can be reduced or eliminated, the service life of the tie will be materially increased. Therefore, it appears that this problem can be licked by the knowledge we already have. First, a tie plate of adequate area to prevent overloading of the wood fibres; second, a design that will eliminate roll or teeter; and third, fastening the plate to the tie in a manner to prevent movement.

At many of the locations on my territory where tie cutting was most severe, the insertion of the longer tie plates, under my supervision, resulted in ties already scheduled for renewal being continued in service for an additional 9 or 10 years, even then being removed only because of the abuses suffered earlier under the shorter plate. Where the life of ties is thus extended nine or ten years by the substitution of longer plates, I am satisfied that sufficient direct savings in tie costs and labor are realized every four or five years to pay for the longer plates and their insertion costs, and that, in addition, there are certain indirect savings and benefits.

Making Subsoil Investigations

How important is it to make preliminary subsoil investigations in unstable roadbed to determine the character and extent of the corrective measures to be taken? How should these investigations be made and by whom?

Always Investigate

By John M. Robertson
Drainage Engineer, Armco Drainage & Metal Products, Inc., Middletown, Ohio

Unstable roadbeds are almost invariably due to subgrade instability caused by an excess amount of water. This condition existing underground is the cause which produces the surface effect of unstable track. To cure such trouble using recommendations based only on surface inspections usually results in about as much success as the fireman who builds up steam pressure in a leaky boiler by throwing more coal on the fire.

Investigations, to be of value, should be supervised by a competent engineer well trained in soil and drainage problems. He will, as a matter of course, make as thorough a study as he deems necessary in each case to satisfy himself as to the true cause of visible surface troubles.

No hard and fast rules can be set as to how extensive each investigation should be. Borings should be made at least once every 100 ft. and frequently must be made as close as every ten feet. The depth of borings may vary from 5 to 100 ft. Their location with regard to the center line of track will depend on the problem encountered, but it is generally good practice to make a complete cross section occasionally to subsfantiate whatever conclusions may be drawn later.

Hand augers 2 in. or 2½ in. in diameter may be used successfully to depths of about 20 ft. For greater depths power-driven augers should be used. These are manufactured by several companies and are available with several types of sampling heads to handle various soils. The most satisfactory, although expensive, way of obtaining soil samples is by digging test pits or lateral trenches through and at right angles to the track. These methods allow the observer to make a good visual inspection of underground conditions and to determine the shape and extent of ballast pockets.

A complete set of field notes is essential in all soil investigations. These should include: (1) The exact location and elevation of all test points; (2) the extent of each soil stratum and its physical description (grain size, color and water content); (3) the elevation of the free water table after reaching stability; (4) the rate of water infiltration; (5) the direction of ground-water flow; and (6) weath-

er conditions during and for several weeks before the tests are made. Aside from these data, where laboratory facilities are available, soil samples should be taken to determine moisture content, soil density and grain-size distribution.

Where a thorough investigation has been made and the above factors properly considered, the solution will become clearly defined. Generally the conclusion reached is that water in excessive quantities has caused a reduction in the bearing power of the soil and its removal will be necessary to return the roadbed to a stable condition.

Removal of water can be most easily effected by drainage, and by studying the location, elevation and direction of flow subdrain pipes can be correctly placed to give the desired results. Adequate consideration of the type of pipe to be installed is required to make certain that disjointing, malalinement and soil infiltration will not take place. These factors have led to the use of perforated, corrugated metal pipe by many railroads for their subdrainage work and have resulted in years of trouble-free service.

This problem should be treated in the same manner as a serious personal ailment. Call in a well qualified doctor, obtain a complete physical examination, determine the root of the trouble and prescribe a treatment that will cure and maintain the patient in the best of health.

Should Secure Facts

By Principal Assistant Engineer

No railroad engineering staff should undertake any large-scale roadbed stabilization program until it has made a thorough subsoil investigation and determined the extent, character or desirability of remedial measures. Such investigations will save time and money in directing corrective efforts toward critical areas and diverting attention from more obvious, yet less important, spots.

Naturally, such investigations should be made in the most economical and expeditious manner. As more and more of this sort of work is being done all over the country on construction work, and on highway and railroad maintenance, effective procedures are being evolved to make all types of subsoil investigations. Along with such procedures, standardized systems of analyzing the findings are being worked out. No definite method can be said to govern all cases. Each situation must be judged as to its requirements. If possible, power-operated augers and other equipment should be used to effect the economies inherent in such machines.

In some cases railroad forces can be used to make the investigations. In others it may be wiser to employ qualified contractors who are experienced in the work and have modern machines that give accurate results.

Weed Control Near Timber Storage

What are the most practicable and effective methods of controlling weed growth about wood preservation plants and timber storage areas? Explain. Are special precautions necessary?

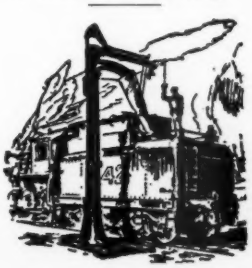
No Panacea Found Yet

By A. S. Daniels

Superintendent Wood Preserving Works, Southern Pacific Lines in Texas & Louisiana, Houston, Tex.

Probably no one method of weed control is most practicable and effective under all conditions. Under certain conditions burning may be best, while shovel-cutting may be necessary under another set of conditions. Broadly speaking, chemical control is superior to the mechanical methods, such as scalping, scraping, mowing, etc., mainly because the mechanical methods are either very time-consuming or are of a comparatively temporary nature. Scalping or shovel-cutting requires about one man-hour per 250 sq. ft., but may have to be repeated only once during the year. On the other hand, ten times as much area can be covered per man-hour by mowing, but the work may have to be repeated every two or three weeks.

In general, chemical control consists of applying either a dry chemical salt or salt solution direct to the young vegetation. Water solutions can be easily applied from a tank mounted on a push car. The tank bottom should be four or five feet above the rail to provide hydraulic pressure and should have attached to it two hoses of sufficient length, say 30 or 40 ft. Common garden hose is satisfactory. A small piece of sheet brass, bent and wired to the hose end, makes a good deflector to break up the stream into a sheet of droplets. The flow is shut off by tossing the hose end into the tank. A laborer, grasping the hose a couple of feet from the end, swings it, pendulum fashion, across in front of him as he walks briskly along. He can effectively cover a swath six or eight feet wide and work between stacks of material or in open areas with equal facility.



Two laborers, one on each side of the track, alternately spraying and moving the push car, can cover 3,000 sq. ft. per man-hour. A little effort expended in getting the laborers into the proper step or rhythm will produce very uniform coverage. This coverage can be checked by operating over a bare or dusty area. Once the rate of coverage is established, the pounds of dry salt per unit area can be varied by changing the concentration of the solution.

Dry chemicals are a little more difficult to aply with simple equipment. A hand-operated crop duster handles finely divided chemicals very well, but fast and uniform coverage is difficult to secure, apparently because the tendency is to squirt it at individual plants. Coarser chemicals, up to the size of ice cream salt, can be quickly and uniformly distributed with a hand operated seed broadcaster. The use of either of these devices involves carrying considerable weight. Further, the dry chemicals act slower than a solution, hence they are more apt to be washed away by an unexpected rain.

Special precautions are necessary in the use of most chemicals. Consideration must be given to the toxic effect it may have on animal life. The possibility of the chemical getting into the local drainage and causing damage downstream must not be overlooked. The chemical should be applied as early as possible in the growing season, first, because it is then most effective, and second to hold to a minimum the amount of dead vegetation which will constitute a fire hazard. Some chemicals and some proprietary weed killers leave the vegetation in an extremely inflammable condition. As a final precaution the area to be treated should be covered as uniformly as possible, for any attempt to treat individual plants will generally lead to waste of time and chemicals.

When everything is taken into consideration, probably the most satisfactory chemical weed control is a

saturated water solution of sodium chloride—common table salt. Five to 10 lb. of dry salt per 100 sq. ft. of area gives excellent results. It is probably the lowest priced weed killing chemical on the market. It is harmless to man or beast. If anything it reduces the inflammability of dead vegetation. It is toxic to all plants and its effect appears to be cumulative. Its only bad effect that we have been able to find is that it will corrode rail and track fastenings.

Tries Creosote Mixture

By W. E. Doty
Timber Treating Engineer, New York Central, Rome, N. Y.

Our experience in weed killing is extremely limited, because up until this year we had used only a very small quantity of various commercial sprays or a solution of rock salt and water. However, these methods were not used enough to establish a definite opinion as to their value. We depended mainly on man-power with weeding hoes and rakes to keep down grass and weed growths.

This year we are going over our entire yard with a power sprayer, using a mixture of 30 per cent creosote oil and 70 per cent water, both the oil and water being hot when mixed and applied. The permanent value of this is unknown at the present time, as we have been spraying for only about three weeks. We expect to continue this treatment next year and thereafter, as required, if it proves to have the desired effect.

Has Developed Own Formula

By H. R. Duncan
Superintendent of Timber Preservation, Chicago, Burlington & Quincy, Galesburg, Ill.

We have found that the most practical and effective method of controlling weed growth about wood preservation plants and timber storage areas is to use a weed killer solution, consisting of arsenic and caustic soda, manufactured by our own formula and sprayed on the weeds. To do this we have built a sprayer which consists of two locomotive-type air reservoirs mounted on a wagon. They are propelled through the yard with a tractor. One of the reservoirs is filled from our storage tank with the weed spray and the other is filled with compressed air. A long hose with a spray nozzle is connected to the reservoir filled with weed killer.

The tractor moves the equipment to the area to be sprayed and the compressed air furnishes the pressure to spray the weeds. The men doing this work are instructed to protect their hands with gloves and their eyes with goggles as this solution is poisonous and corrosive. It is also important that the tanks be equipped with gauges and be given regular tests the same as any other pressure tank in service.

If the weeds are permitted to mature and go to seed, the seeds are scattered and the weeds will be perpetuated. Therefore, it is important that they be sprayed early in the season.

The spraying should not be done when there is moisture on the weeds, either from dew or rainfall, and the work should not be undertaken when it appears that it is likely to rain, because any moisture on the weeds before or immediately after spraying will reduce the concentration of the poisonous material so that it will not effectively kill the weeds. It is important also that no livestock be permitted to eat any vegetation that has been sprayed with this material because a rather small amount of it is fatal to them.

Usually the use of this method of killing weeds will practically eliminate the growth of weeds after the second or third year. Frequently, however, reapplication may be necessary, particularly on the outer edges of the yard where seeds blow in from weeds growing outside the yard.

Straightening Water Tanks

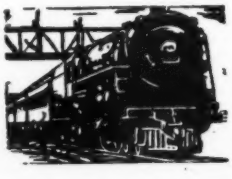
When a water tank has settled out of plumb, what is the best method of correcting the condition? Does the type and capacity of the tank make any difference?

Foundation Depth A Factor

By E. M. Grime
Consulting Engineer, St. Paul, Minnesota

When a water tank settles out of plumb it is usually caused by a defective foundation. In most cases the trouble is that the foundation was not carried down to a point below the level of the water supply main. Should a leak develop in one of the pipe joints under the tank, the escaping water may soften the ground in the immediate vicinity and undermine the foundation, if it is above the leak. Under such conditions I have seen tank posts that were taking no load because the foundation concrete had settled down until there was no bearing. This put a disproportionate and excessive load on the other posts under that section of the tank and caused unequal settlement. In such cases, if repairs are made to the water leak immediately and the earth tamped solidly back under the post supports, further settlement might be avoided.

Other cases of settlement may be due to unfavorable ground conditions, such as quicksand or other soft material which is gradually affected by the jarring of passing trains. Sometimes a severe wind storm may strain a tank substructure to such an extent as to push it out of plumb by loosening up all the bracing. This may throw enough extra load on one side of the foundation to force it out of level.



About the best way to maintain in safe condition a tank that has settled out of plumb is to provide a footing of a heavy, long, flat timber, such as a bridge stringer, on the ground on the low side and then put in several long batter posts extending from this base up to a water-tank cap to take a portion of the load.

The type and capacity of the tank makes little difference since all tanks are usually designed to have equal loading on their foundation piers. Of course, if a tank has a comparatively high substructure any deviation from the perpendicular is much more serious than in the case of a lower tank with a base broader in proportion to its height.

If Serious, Move The Tank

A. R. Nichols
Water Engineer, Wabash, Decatur, Ill.

During the last 20 years we have had so few cases of water tanks settling out of plumb that I doubt if I could be considered an authority on the subject. Although most of the cases we have had were minor, a few were serious enough to require corrective action. The cause of this serious settlement was determined to be unstable soil conditions in which it was found to be more economical to move the tanks to new locations rather than carry the foundations down to solid ground.

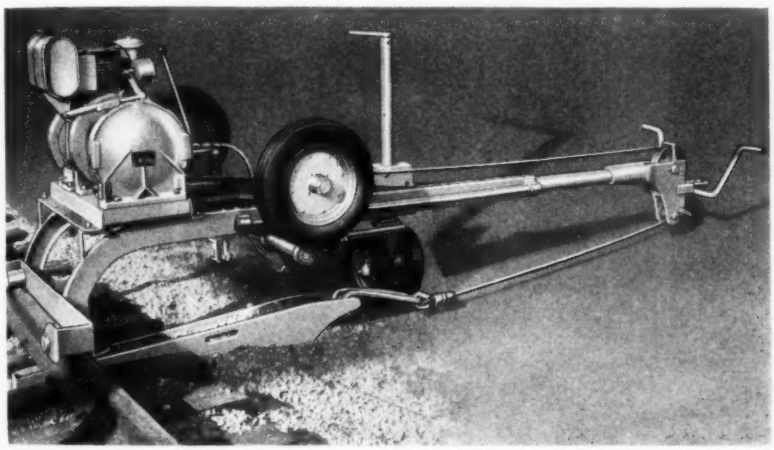
PRODUCTS OF MANUFACTURERS

New, improved equipment, materials, devices

(For additional information on any of the products described in these columns, use postcards, page 839)

Cribbing Machine

THE Pettibone Mulliken Corporation, Chicago, has developed a new portable lightweight machine to provide the pulling power when skeletonizing track with this company's rooter and drag-bucket arrangement. The machine utilizes a winch and cable-arm arrangement by means of which the rooter for loosening the crib ballast is pulled through the crib from one side to the other by a pulling cable, after which the drag bucket for removing the loosened ballast is pulled through the crib in the same manner. After these operations the crib is said to be almost entirely clean of ballast, the small amount remaining being removed by hand.



The PMCO cribbing machine pulling a drag bucket through a crib

The machine consists of a frame on which is mounted a winch powered by a gasoline engine, and a horizontal cable arm fitted at its end with a pulley. When in operating position the engine end of the machine rests on two rollers on one rail of the track, while the cable arm, extending outward in a direction at right angles to the track, is supported on two rubber-tired wheels which rest on the shoulder of the roadbed. The cable arm can be adjusted upward or downward by a hand hydraulic attachment as necessary to attain a horizontal position. The cable, extending from the winch through the pulley at the end of the cable arm and back to the track, is fitted at the end with a hook which is attached to the rooter and the bucket.

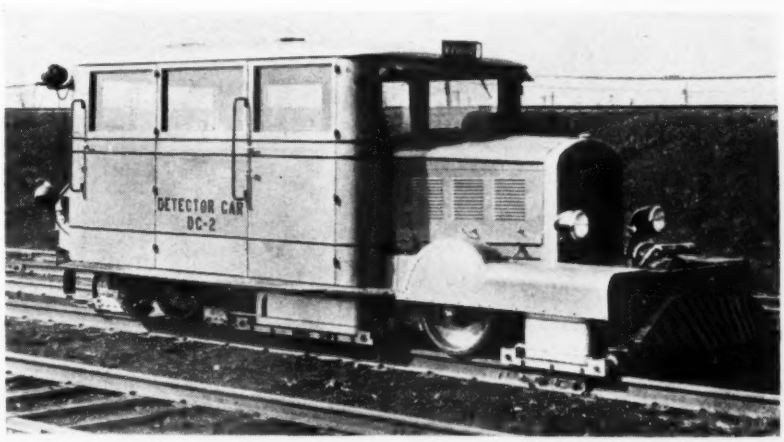
The machine is equipped with two other rubber-tired wheels which can be raised out of the way when the machine is engaged in cribbing work, or lowered to support the weight of the entire unit when necessary to remove it from the track. When the weight is supported on these two wheels the unit can be towed as a two-wheel trailer behind a truck or automobile. Also, the machine can be rolled on the track by utilizing the two rollers mentioned previously and one other roller provided for this purpose.

When fitted with a derrick attachment and outrigger, both of which can be supplied by the manufacturer as extra equipment, the cribbing machine can be used for handling ties.

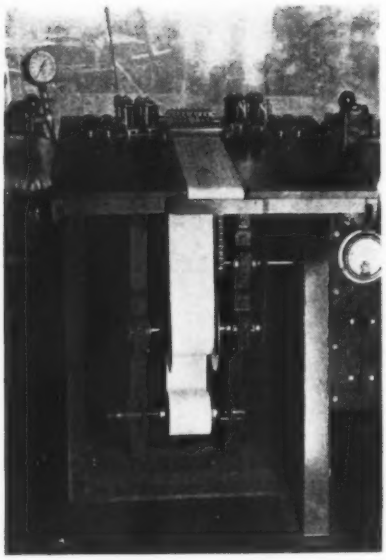
Rail-Flaw Detector Car

TELEWELD, Inc., Chicago, through a subsidiary company—Teledetector, Inc.—has developed a new rail-flaw detector car consisting of an automobile-type inspecton car equipped with detector apparatus, a recording unit, paint gun and hand-test equipment. Flaw detection is accomplished by small, non-magnetic core, pick-up coils operating in a trailing, sustained magnetic field. Both rails of the track are tested at the same time.

The recording unit provides a permanent, paper tape record which is synchronized with the movement of the car. The data picked up by the



The Teledetector rail-flaw detector car



Close-up view of the recording apparatus in the new detector car

detector apparatus are recorded on the tape by eight pen units, four for each rail. The first pen unit for each rail records joints only, providing a land mark or locating means on the tape. The second pen unit records defects in the gage portion of the rail head. The defects in the center and field portions of the rail head are recorded by the third and fourth pens, respectively.

It is claimed that, with the new car, internal flaws, including transverse defects five per cent or more of the rail-head area in size, are recorded throughout the length of the rail, including the portion within the joint bars to within 5 in. of the ends of the rails. It is also claimed that the operation of the car is not effected by joint bars, bolt holes, high spikes, rail anchors and braces or any other track fastenings; and that it operates successfully through switches, frogs, crossings and guard rails. When a flaw is picked up by the detector apparatus, the paint gun places a spot of paint on the rail within one inch of the location of the flaw, it is said.

The unit operates at a testing speed of about 7 m.p.h. and is said to be capable of covering from 15 to 25 mi. of track per day, depending on the condition of the rail and traffic.

New Tournapull

R. G. LETOURNEAU, Inc., Peoria, Ill., has announced a new addition, the Model C Tournapull, to its line of earth-moving equipment. The new unit, which is powered by a 150-hp., 6-cylinder Diesel engine, has four forward speeds ranging from 2.19 m.p.h. to 17.3 m.p.h. It is used with the Model E16 Carryall scraper which has a capacity of 13.3 cu. yd., or 16 tons.

One of the features of the new unit is electric control of steering, and of the scraper bowl, apron and tail gate by individual electric motors supplied with current from a 240-volt, 120-cycle alternating-current generator built in line with the Tournapull engine. Steering and scraper operations are controlled through these motors by toggle switches on the control panel of the Tournapull.

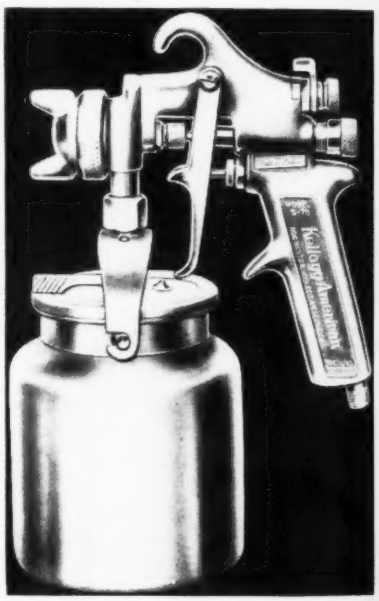
Another feature of the new unit is a constant-mesh transmission which is said to permit instantaneous selection of gear ratios by a single selection lever, eliminating conventional foot clutches and shifting of gears. The machine is equipped with a torque proportioning differential. If, when operating in soft materials, one wheel should start to slip, the differential automatically delivers to the wheel on firmer footing a tractive effort ranging up to four times the tractive effort of the slipping wheel, it is said.

The Tournapull and scraper are mounted on wheels with 21 by 25 tapered bead tires. The unit is equipped with disc air brakes. The specifications of the Model C Tournapull with the E16 Carryall scraper are as follows: Length 31 ft.; height 9 ft. 3 in.; width 11 ft. 4 in.; wheelbase 18 ft. 2 in.; and empty weight 29,220 lb. The combination has more than a 90-deg. turning angle and can turn around within a radius of 14 ft. 6 in.

The Model C Tournapull with E16 scraper in operation

Paint Spray Gun

A NEW paint spray gun, known as the Micro-Spray, which is said to produce a smooth, high-gloss finish, has been announced by the American Brake Shoe Company, Kellogg Division, New York. This has been made possible, it is claimed, by incorporating new design features which have produced a more uniform flow of air and paint, resulting in a finer atomization and a more even paint distribution. Detrimental effects from air-pressure drop and eddy currents are reported to have been eliminated.



The new Micro-Spray gun

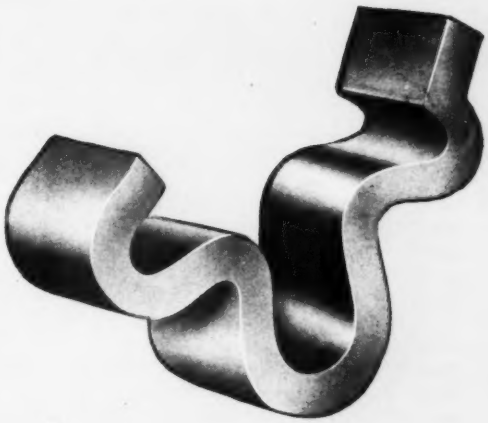
The new sprayer features simplicity of design with consequent savings, it is said, in cleaning and assembly time. The entire head can be removed as a unit by removing the locking screw and lock nut. Only one fluid needle is required for all paint spraying, and the fluid needle assembly can be quickly removed in one piece for cleaning. The fluid needle and air valve stem are provided with spring-loaded, self-adjusting packing which is said to

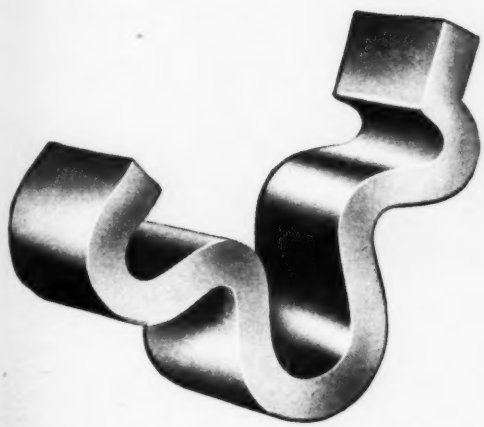
(Continued on page 828)

(For additional information on any of the products described on this page, use postcards, page 839)

ONE PIECE! TWO EQUAL GRIP JAWS—One on each side of rail base.

WIDE STEEL SECTION reduces possibility of derailed wheels punching anchor thru rail base. Dragging equipment has little or no effect on this anchor. The design offers little for equipment to come in contact with.





HERE'S WHY

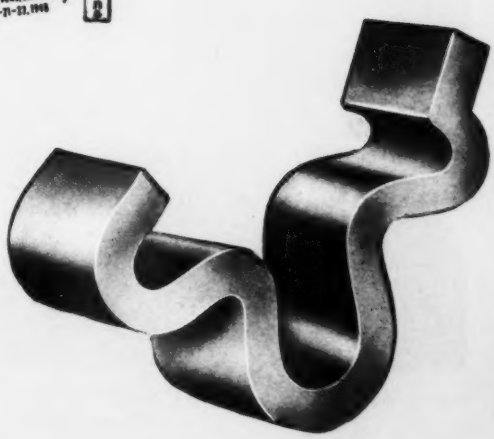
THE ADVANCED TYPE WOODINGS RAIL ANCHOR IS THE WORLD'S MOST POWERFUL RAIL ANCHOR!

EXHIBITOR
BRIDGE & BUILDING
TRACK SUPPLY
ASSOCIATIONS
HOTEL STEVENS, CHICAGO
SEPT. 20-21-22, 1948

FACETS TO PROVIDE SLIDING ADJUSTMENT OF ANCHOR CONTACTS TO RAIL. Anchor is self-adjusted to top corners of rail base until four equally spaced contacts are made between anchor and rail. This enables anchor to *ADJUST ITSELF TO TOLERANCES IN RAIL BASE DIMENSIONS.*

THE WORLD'S MOST POWERFUL RAIL ANCHOR

WOODINGS
FORGE & TOOL CO.
VERONA, PA. • CHICAGO, ILL.



eliminate leakage and the need for adjustment. The design of the air and fluid connections is said to permit quick and easy removal of the container and hose without disturbing or damaging the connections to the gun.

A built-in lever is reported to give finger-tip control of desired air volume according to the setting marked on the gun body, and provision has been made for accurate control of spray width. If a change in the spray pattern from horizontal to vertical is desired, the air cap can be turned freely by the fingers without the need of loosening or adjusting the air-cap ring nut. The air distributors in the air cap wing jets make it possible, it is said, to maintain a good spray pattern at high spray pressures, eliminating the possibility of a fish tail or split in the pattern. It is reported that only three spray heads are needed to cover the full range of paint-spray materials. The air cap and fluid nozzles have been designed so that any of the three combinations may be used for both siphon and pressure spraying.

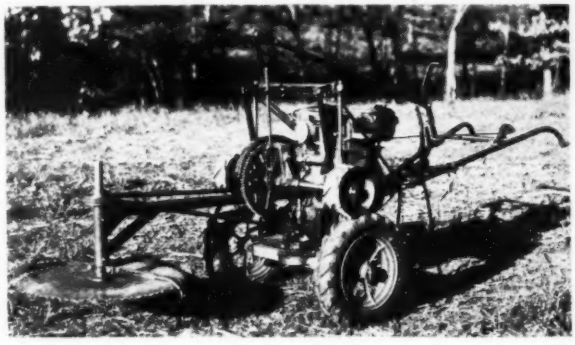
Safety Jack Support

A NEW device which may be chained against the side of a post or pile to act as a support for a jack has been developed by Templeton, Kenly & Co., Chicago. This device, known as the Simplex aluminum alloy safety jack support and designated No. JS-1, is designed to replace the wooden wedge support commonly used for this purpose. Made of aluminum it weighs only 8¾ lb.

Applications of the new jack supports include raising the decks of either ballast-deck or open-deck bridges to replace defective caps, raising coal chutes and sand towers, and many other similar jobs. With four of these supports, it is said that the heaviest structures of this type can be handled safely. It is reported to be especially adapted for use on high scaffolds because of its light weight and ease of placement. It has a height of 15 in. and a platform size of 7 in. by 10 in.

Saw Outfit

THE Ottawa Manufacturing Company, Ottawa, Kan., is introducing into the railroad field a self-propelled saw outfit, known as the Buzz Master, for use in cutting weeds, brush and trees on rights of way, around pole lines and in the vicinity of bridges and culverts. The unit is powered by a 7-hp. gasoline engine which is mounted, along with the drive machinery, above the axle of a two-wheel carriage with 4.00 by 12 pneumatic tires. Located at the rear of the unit are two handles, by means of which the machine is guided by the operator. The operating controls are conveniently arranged on the handles. Extending forward in a horizontal position from the front of the unit is a cantilever arm which is fitted at its outer end with an adjustable saw shaft and a V-belt driven rotary saw, 30 in. in diameter.



The Ottawa Buzz Master saw outfit

When the machine is used in clearing operations the saw blade is mounted in such a position that it rotates in a plane parallel with the ground. The height of the cutting edge of the blade above the ground can be varied as desired by adjustment of the saw shaft. One of the features of the outfit is a pivot axle, or "fifth wheel," located at the center of the carriage axle, which permits swinging the saw into a tree independently of the wheels. This feature, it is said, makes it possible to cut all the way through a tree with no binding of the blade. If desired the saw blade can be turned so that it will rotate in a vertical plane.

Self-propulsion of the unit is accomplished by two drive spools with lugs, one spool being placed directly above each of the two tires. When the operating handle, located at the right of the operator, is pushed forward, the drive spools drop down and rest on the tires. The lugs of the spools engage the treads of the tires and the resulting gear-like action propels the machine. The machine can be propelled by this means at two speeds—a low speed of 1¼ m.p.h. for operation in heavy growths, and a high speed of 3 m.p.h. for sparse growths and road travel. There is also a neutral position which permits the drive spools to remain idle while the unit is engaged in sawing trees.

Various attachments are available for use with the Buzz Master, including a flat pulley for the operation of various types of belt-driven machinery, a 48-in. sickle bar for mowing weeds and grass, and a 10-in. by 36-in. auger for boring post holes.

Raising the deck of a ballast-deck bridge with a set of four Templeton, Kenly Simplex safety jack supports

(For additional information on any of the products described on this page, use postcards, page 839)

Study these eight valuable features

Capacity 60 cubic feet per minute actual air at 100 pounds p.s.i. Perfect for four tampers or other tools.

Motor-driven crawler treads to position compressor anywhere, on or off the track.

Easily self-loaded on rail dolly, trailer, or truck for fast transportation to the job.

Unique, compact power plant. Both the motor and the compressor cylinders are balanced in a V-8 block.

Push button starting.

Simple driving controls. Complete maneuverability.

Quickly adaptable to such general purposes as towing, backfilling, and operating stationary machinery (saws, pumps, etc.)

Famous Schramm dependability that comes from 40 years of experience building portable compressors.

WHEN a maintenance engineer is introduced to Schramm's Model 60 Crawler, there is not much for us to say about it. For this versatile compressor's advantages are so self-evident that after one look a man is full of his own ideas for using it. He sees at once how perfect it is for spot tamping and, with added units, for bigger jobs as well. Usually he itches to sit behind the controls, touch the starter, and go places.

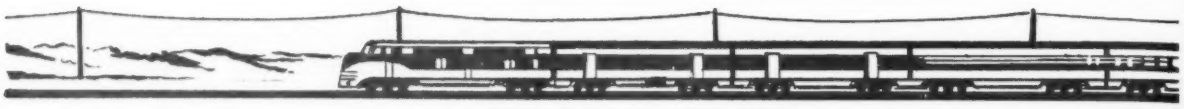
Everyone says we have done a great job in designing and building the Model 60 Crawler, and you will agree when you have actually seen and handled one. But as a prelude to that, why not get all the facts about it? They are presented in Bulletin FC 48. Write Schramm's Railway Sales Division today for your copy.

SCHRAMM INC.

THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA

THE MONTH'S NEWS

Happenings among the railways—the associations—the suppliers



Eastern Passenger Fares Go Up

In a decision made public on July 7, the Interstate Commerce Commission authorized all railroads in the Eastern and Pocahontas regions to increase, on five days notice, their first-class and coach fares to an extent estimated to yield approximately $61,000,000 in additional annual revenues. One-way coach fares were to be increased in the affected territory from 2.5 cents per mile to 3 cents per mile (except for the New York, New Haven & Hartford, on which road the increase will be from 2.875 cents per mile to 3 cents per mile), while one-way first-class fares were to be increased from 3.5 cents per mile to four cents per mile.

Chicago Railroad Fair Now Open

The Railroad Fair at Chicago, celebrating 100 years of railroad progress, opened its gates on Tuesday, July 20. Sponsored by 38 railroads and spread over an area of 50 acres on Chicago's lake front, the fair features, among many other things, a 1½-hr. transportation pageant, an array of railroad and supply manufacturers' exhibits, and an authentic Colorado narrow-gage line on which visitors may ride for a 10-cent fare. The highlight of the entire fair is the pageant presentation four times daily—at 2 p.m., 4 p.m., 7:15 p.m. and 9 p.m. In this spectacle some 220 professional performers, aided by much old-time railroad and other equipment, trace the history of transportation from late in the seventeenth century to the modern railroad. Individual exhibits, many of them on an elaborate scale, are being presented by approximately 23 railroads and 26 railroad supply and service companies. Indications are that the Fair will remain open through September.

Third Quarter Loadings Expected to be Higher

Freight car loadings in the third quarter of 1948 are expected to be 3.7 per cent above those in the same period in 1947, according to estimates made by the 13 Shipper's Advisory Boards. On the basis of these estimates, freight car loadings of the 32 principal commodities will be 9,138,874 cars in the third quarter of 1948, compared with 8,814,081 actual car loadings for the same commodities in the corresponding period last year. All of the 13 boards, except those for the Southwest and the Trans-Missouri-Kansas region, estimate an increase in car loadings for the third quarter as compared with the same 1947 period.

Federal Control Ends As Wage Dispute is Settled

On July 9, the day after a basis of settlement had been reached in the long-standing dispute between the railroads and three "holdout" operating unions, government control of the railroads was terminated by Secretary of the Army, Kenneth C. Royall. The railroads had been under government control since May 10 when the recommendations of an emergency board appointed by President Truman were rejected by the three unions—the Brotherhood of Locomotive Engineers, the Brotherhood of Locomotive Firemen and Enginemen, and the Switchmen's Union of North America. The roads were seized when the unions threatened to strike on May 11.

The settlement calls for the same 15½-cents-per-hour basic wage increase that was accepted last fall by other employees and recommended for the holdout operating unions in the emergency board report which they rejected. In addition, it provides for a number of working rule changes beyond those proposed by the board. Because the latter involve some "swapping," the management representatives consider that the whole adjustment reflects adherence to their position that any settlement would have to be "within the framework" of the emergency-board report.

Changes in Railway Personnel

General

William L. D. Johnston, supervisor of track on the Southern, with headquarters at New Albany, Ind., has been promoted to trainmaster, with headquarters at Louisville, Ky.

John P. Mumford, trainmaster on the Southern, with headquarters at Charlottesville, Va., and an engineer by training and experience, has been promoted to assistant superintendent, with headquarters at Knoxville, Tenn.

Joseph F. Davis, general superintendent of the Southern district of the Missouri Pacific, with headquarters at Little Rock, Ark., and an engineer by training and experience, has retired after more than 50 years of railroad service.

J. Benton Jones, general superintendent of the Eastern Ohio division of the Pennsylvania at Pittsburgh, Pa., and a former division engineer, has been promoted to general manager, with headquarters at New York.

H. B. McColgan, Jr., supervisor of bridges and buildings on the Scioto division of the Norfolk & Western, has been appointed assistant superintendent of the Scioto division at Portsmouth, Ohio, succeeding **John W. Neikirk,** whose appointment as manager of roadway maintenance is noted elsewhere in these columns.

Morton S. Smith, superintendent of the Philadelphia division of the Pennsylvania at Harrisburg, Pa., and a former division engineer, has been promoted to general superintendent, with headquarters at Chicago, succeeding **J. H. Cooper,** an engineer by training and experience, who has taken a leave of absence pending his retirement on October 1. **W. G. Pfohl,** division engineer of the Maryland division, with headquarters at Baltimore, Md., has been promoted to assistant superintendent of freight transportation of the Central region, with headquarters at Pittsburgh, Pa., succeeding **T. M. Goodfellow,** who has been promoted to superintendent of the Delmarva division, with headquarters at Cape Charles, Va. Mr. Goodfellow, an engineer by training and experience, succeeds **R. W. Grigg,** also an engineer, who has been transferred to the Philadelphia division, at Harrisburg, Pa., replacing Mr. Smith.

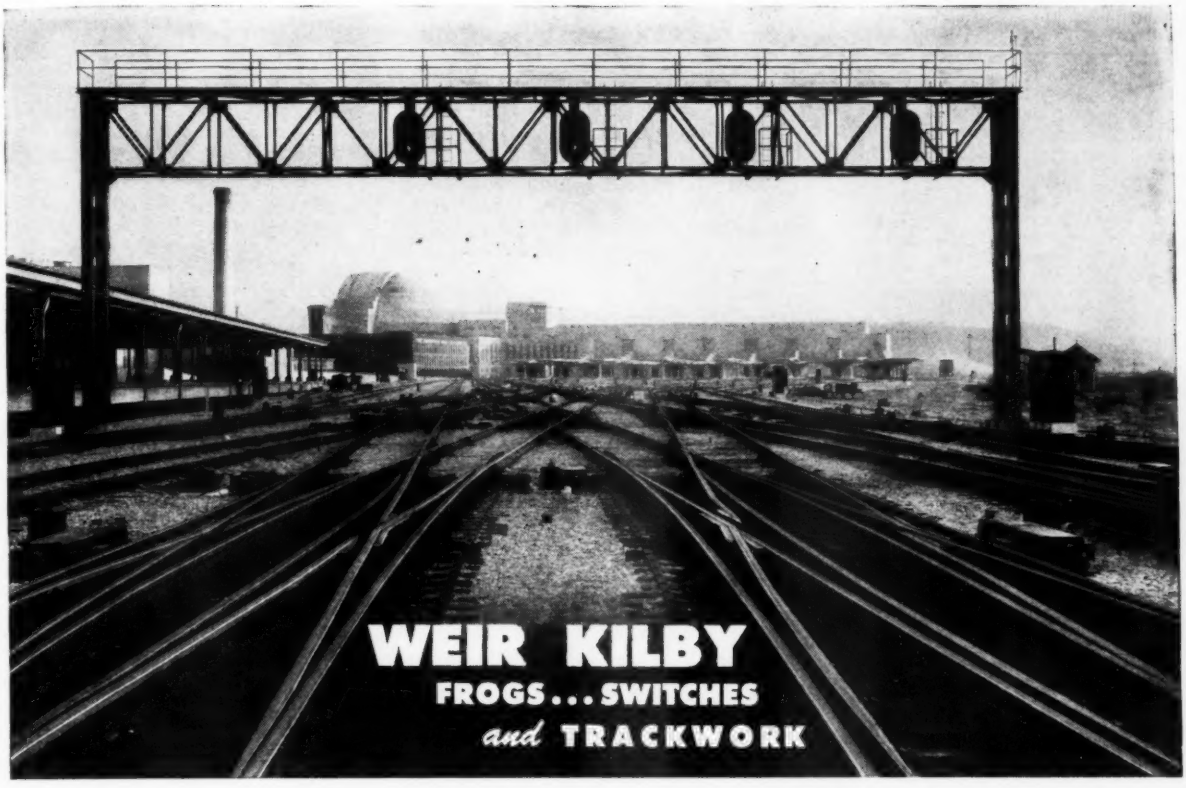
Engineering

Russell B. Fetters, roadmaster on the Chicago, Rock Island & Pacific, with headquarters at Goodland, Kan., has been promoted to division engineer at Fort Worth, Tex., succeeding **A. C. Bradley,** who has retired.

B. E. Crumpler, assistant engineer on the Norfolk & Western at Roanoke, Va., has been transferred to Bluefield, W. Va., where he succeeds **E. H. Roth,** who in turn has been transferred to Roanoke.

John W. Neikirk, assistant superintendent of the Scioto division of the Norfolk & Western at Portsmouth, Ohio, has been appointed manager of roadway maintenance, with headquarters at Roanoke, Va., to succeed **J. R. Derrick,** whose death is reported elsewhere in these columns.

(*Please turn to page* 832)



On the job LONGER

WEIR KILBY FROGS, SWITCHES, GUARD RAILS and CLAMPS, CROSSINGS . . . MANGANESE and HEAT TREATED RAIL WORK . . . BUILT TO A.R.E.A. or RAILROAD SPECIFICATIONS

The products of Weir Kilby Corporation are well and favorably known by the many railroads and large industrial plants of the country.

Having factories located at both Cincinnati and Birmingham, each carrying substantial inventories of raw materials, we are well situated to meet your varied needs.

Weir Kilby's combination of competent engineering, modern machines and skilled operators, all work together for our customers' advantage.

Standard and Special Track Work for Steam Railroads Since 1882

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Successors to

WEIR FROG CO. . . . KILBY FROG & SWITCH CO. . . . CINCINNATI FROG & SWITCH CO.

Railway Personnel (Cont'd)

John J. Clutz, whose promotion to assistant to the chief engineer of the Eastern region of the Pennsylvania, with headquarters at Philadelphia, Pa., was announced in the May issue, was born on June 30, 1904, at Carthage, Ill., and graduated from Gettysburg college in June, 1924. He entered railway service on June 15 of that year, doing construction and

John J. Clutz

location work for the Louisville & Nashville, and later served in the valuation department of the New York Central. He entered the service of the Pennsylvania on June 1, 1926, as a rodman and was promoted to assistant supervisor of track at Camden, N.J., in February, 1927, later serving in this capacity at Philadelphia, and Huntington, Pa. He became supervisor of track at Clayton, Del., in June, 1929, and subsequently was stationed at Washington, D.C., Hollidaysburg, Pa., Middleton, Pa., Jamesburg, N.J., and Trenton. In August, 1939, Mr. Clutz was promoted to assistant division engineer of the New York division and in February, 1940, he was promoted to division engineer of the Indianapolis division, later becoming engineer maintenance of way and structures of the Washington Terminal Company, Washington, D.C. He was furloughed for military service in April, 1942, and served in the Military Railway Service until January, 1946, when he was discharged from the army with the rank of colonel. Returning to the Pennsylvania, he became division engineer on special duty in the office of the chief engineer, with headquarters at Philadelphia, the position he held at the time of his recent promotion.

Recently Mr. Clutz was on temporary active duty in the army as deputy director of the Allegheny region, Department of the Army Operation of Railroads, with headquarters in Baltimore, Md., but has now returned to railroad service.

F. S. Hutton has been appointed division engineer on the Canadian National, with headquarters at Hornepayne, Ont. **T. A. Hunt** has been appointed assistant engineer at St. Catharines, Ont. **R. H. Menary** and **R. A. Shier** have been appointed assistant division engineers at London, Ont., and Belleville, Ont., respectively.

H. C. Minteer, assistant division engineer on the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Terre Haute, Ind., has been promoted to division engineer at that point, succeeding **B. E. Daniels,** who has been transferred to Spokane, Wash.

J. D. Hadley, draftsman in the office of the chief engineer of the Louisville & Nashville, at Louisville, Ky., has been promoted to assistant engineer on the Knoxville and Atlanta division, with headquarters at Knoxville, Tenn., succeeding **J. W. Leinard,** who has been appointed assistant engineer in the miscellaneous department of the chief engineer's office at Louisville.

A. E. Wolff, assistant engineer maintenance of way on the Eastern region of the Canadian Pacific, with headquarters at Toronto, Ont., has been promoted to engineer maintenance of way, with the same headquarters, to succeed **W. O. Cudworth,** who has been granted a leave of absence on account of illness. **J. R. Caswell,** district engineer at North Bay, Ont., has been appointed assistant engineer maintenance of way at Toronto to succeed Mr. Wolff.

W. M. Jaekle, division engineer of the Southern Pacific's Coast division, with headquarters at San Francisco, Cal., has been appointed construction engineer, to supervise the construction of the road's relocation around Meridian Dam Reservoir, between Oakridge, Ore., and Eugene, and other work as assigned. He is succeeded by **J. E. Wheeler,** division engineer at Dunsmuir, Cal., who in turn is replaced by **K. C. Brunner.**

B. R. Meyers, assistant to chief engineer of the Chicago & North Western at Chicago, has been promoted to assistant chief engineer at that point, succeeding **R. R. Strother,** who has retired after 39 years of service with the road. Mr. Meyers is succeeded by **H. W. Jensen,** division engineer at Chicago. **J. P. Datesman,** division engineer at Green Bay, Wis., has been transferred to Chicago, and **William Wilbur,** acting division engineer at Chadron, Neb., has replaced Mr. Datesman at Green Bay. **W. V. Kerns,** who has been on leave of absence from his post as division engineer at Chadron, has returned to his position there.

Malcolm Young, assistant division engineer of the Maryland division of the Pennsylvania, with headquarters at Baltimore, Md., has been promoted to division engineer of the Renovo division, to succeed **W. H. Kendall,** who has resigned. **J. E. Chubb,** supervisor of track on the New York division, with headquarters at New York, has been promoted to assistant division engineer of the Maryland division to succeed Mr. Young.

W. C. Gretzinger, assistant division engineer of the Philadelphia Terminal division of the Pennsylvania, with headquarters at Philadelphia, Pa., has been promoted to division engineer of the Grand Rapids division, with headquarters at Grand Rapids, Mich., succeeding **N. L. Fleckenstine,** who has been transferred to the Maryland division at Baltimore, Md. Mr. Fleckenstine succeeds **W. G. Pfohl,** whose promotion to assistant superintendent of freight transportation is noted elsewhere in these columns. **C. F. Parvin,** supervisor of track on the Philadelphia Terminal division, at Philadelphia, has been promoted to assistant division engineer of that division to succeed Mr. Gretzinger.

R. S. Dunkle, supervisor of track on the Wilkes-Barre division of the Pennsylvania, has been promoted to assistant engineer in the office of the engineer maintenance of way of the Southern division, with headquarters at Wilmington, Del.

E. T. Gove, whose appointment as assistant district engineer of the Canadian National, at North Bay, Ont., was noted in the May issue, was born at St. Andrews, N.B., and entered the service of the Canadian National in 1918 as instrumentman, with headquarters at Toronto, Ont. In 1928 he was promoted to assistant engineer, and from 1941 to 1944 he served in a supervisory capacity in the engineering department, with the title of engineer in charge. In January, 1944, Mr. Grove was appointed assistant to engineer maintenance of way.

George M. Smith, whose appointment as engineer maintenance of way and structures of the Washington Terminal Company, at Washington, D.C., was announced in the May issue, was born on December 11, 1911, in Petersburg, Va. He graduated from the Virginia Polytechnic Institute in 1935, with the degree of B.S. in Civil Engineering and entered railway service on June 21 of that year as engineer apprentice on the Central region of the Pennsylvania. He became assistant supervisor of track at Aspinwall, Pa., in

George M. Smith

April, 1936, and later served in that capacity at Canton, Ohio, and Perryville, Md. Mr. Smith was promoted to supervisor of track at Carrothers, Ohio, on the Toledo division, in February, 1941, and remained there until January, 1942, when he was transferred to Columbus, Ind., on the Indianapolis division. In July, 1943, he was moved to Piqua, Ohio, on the Columbus division, and was transferred to the Pittsburgh division, at Johnstown, Pa., in April, 1944. Mr. Smith was promoted to assistant division engineer of the Middle division at Altoona, Pa., in April, 1947.

(*Please turn to page* 834)

"We Get 75,000 Gallons of Chemical Weed Killer Gratis Every Year!" "Pretty Soft—But How Come Boss?"

"We fooled around for years with our weed problem, did some mowing, some steaming and some burning, and got nothing but a top kill. Much time was wasted by our section men in an effort to keep the track clean. Fouled ballast prevented drainage in our roadbed and tie replacements piled up."

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PLANTS AT NUMEROUS RAILROAD CENTERS

Railway Personnel (Cont'd)

S. McIlwain, whose promotion to division engineer of the Canadian National, with headquarters at Allandale, Ont., was noted in the May issue, was born at Goderich, Ont., and entered railroad service in 1906 as an axeman on the Canadian Northern (now part of the Canadian National) at Pary Sound, Ont. He subsequently served as rodman and instrumentman, and in 1911 was advanced to resident engineer at Ottawa, Ont. In 1919, Mr. McIlwain was promoted to division engineer at Capreol, Ont., later being transferred to Ottawa. In 1943 he was appointed assistant division engineer at Allandale, which position he was holding at the time of his recent promotion.

William N. Myers, whose appointment as assistant division engineer of the Pennsylvania, with headquarters at Harrisburg, Pa., was reported in the May issue, was born on June 6, 1912, at Cumberland, Md., and was graduated from Johns Hopkins university in 1933. He entered the service of the Pennsylvania in July, 1934, as an assistant on the engineer corps at Cleveland, Ohio. From April, 1936, to September, 1940, he served as assistant supervisor of track at various locations, being promoted to supervisor of track on the latter date, with headquarters at New Castle, Pa. In November, 1943, he was transferred to Huntingdon, Pa., at which point he was stationed at the time of his recent appointment as assistant division engineer.

Track

Fred L. Lemon, assistant supervisor of track on the New York Central, at Elyria, Ohio, has retired after 44 years of service.

R. M. DeMoss, ballast cleaner supervisor on the Atchison, Topeka & Santa Fe at Amarillo, Tex., has been promoted to roadmaster, with headquarters at San Angelo, Tex.

Noble Hurd has been appointed roadmaster on the Chicago, Rock Island & Pacific at Goodland, Kan., to succeed **R. B. Fetters,** whose appointment as division engineer is noted elsewhere in these columns. **Sam Haas** has been appointed assistant roadmaster at El Reno, Okla., succeeding **Rex Price,** transferred.

L. Stott, roadmaster on the Canadian National at Smiths Falls, Ont., has been transferred to Lindsay, Ont., to succeed **J. D. Sauve,** also transferred, and **H. R. Dancy** has been appointed roadmaster, with headquarters at Smiths Falls, to succeed Mr. Stott. **R. F. Leighton** has been appointed acting roadmaster, with headquarters at Gorham, N.H., to succeed **A. C. Parent.**

Joseph T. Mersmann, whose appointment as supervisor on the Terminal Railroad Association of St. Louis, with headquarters at East St. Louis, Ill., was noted in the July issue, was born on November 5, 1894, at Portage de Sioux, Mo. He entered railroad service in January, 1914, with the Chicago, Burlington & Quincy at Hannibal, Mo., and from October, 1917, to June, 1919, he served with the U.S. Army in France. In July of the latter year he returned to the Burlington at St. Louis, Mo., and in October, 1923, he went with the Terminal Railroad Association of St. Louis.

Robert S. Fonda, assistant supervisor of track on the Mohawk division of the New York Central, has been promoted to supervisor of track, Subdivision 3, with headquarters at Springfield, Mass., to succeed **W. A. Bump,** retired. **Harvey C. Fryer,** assistant supervisor of track on Subdivision 7, Mohawk division, has been transferred to Subdivision 8, with headquarters at Oneida, N.Y., to succeed Mr. Fonda, and **Charles A. Ford** has been appointed assistant supervisor of track on the Mohawk division, with headquarters at Utica, N.Y., succeeding Mr. Fryer.

John T. Hiner, assistant track supervisor on the Richmond division of the Southern, with headquarters at Richmond, Va., has been promoted to track supervisor at South Clarksville, Va., to succeed **John W. McPherson,** who has been transferred to Keysville, Va.

Mr. Hiner was born on February 16, 1921, at Marlinton, W. Va., and entered the service of the Southern as a laborer at Charlottesville, Va., in June, 1942. He subsequently served as rodman and transitman at Charlotte, N.C., and from December, 1946, to August, 1947, served as a student apprentice at Charlottesville. He was appointed assistant track supervisor on the latter date, and was holding this position at the time of his recent promotion.

Changes on the Pennsylvania

R. R. McClain, assistant main line supervisor on the Middle division of the Pennsylvania, with headquarters at Huntingdon, Pa., has been promoted to supervisor on the Delmarva division at Harrington, Del., where he succeeds **M. B. Miller,** who has been transferred to the Philadelphia Terminal division, with headquarters at Philadelphia, Pa. Mr. Miller, in turn, succeeds **C. F. Parvin,** whose promotion to assistant division engineer is noted elsewhere in these columns. **J. H. Burdakin,** junior engineer on the Middle division, with headquarters at Lewistown, Pa., has been promoted to assistant branch line supervisor at Jamesburg, N.J., on the New York division, to succeed **W. S. Titlow, Jr.,** who has been transferred to the Middle division at Huntingdon, to succeed Mr. McClain.

J. J. Baffa, assistant main line supervisor of the Middle division, with headquarters at Lewistown, has been promoted to supervisor at New Castle, Pa., on the Erie and Ashtabula division, to succeed **C. A. Beemer,** who has been transferred to the Ft. Wayne division, at Ft. Wayne, Ind. Mr. Beemer replaces **J. M. Kirschner,** who has been transferred to the New York division, with headquarters at New York, succeeding **J. E. Chubb,** who has been promoted to assistant division engineer, as noted elsewhere. **M. Brown,** junior engineer on the New York zone, has been promoted to assistant branch line supervisor on the Philadelphia division at Enola, Pa., replacing **L. D. Freeman,** who has been transferred to the main line at Lewistown, to succeed Mr. Baffa.

G. W. Sturgeon, assistant supervisor on the New York division, with headquarters at New Brunswick, N.J., has been promoted to supervisor on the Wilkes-Barre division, with headquarters at Sunbury, Pa., succeeding **R. S. Dunkle,** whose promotion to assistant engineer is noted elsewhere. **J. S. Kay,** general foreman at Canton, Ohio, on the Eastern division, has been promoted to assistant supervisor on the Cleveland division at Cleveland, Ohio, to succeed **E. T. Lyons,** who has been transferred to New Brunswick to succeed Mr. Sturgeon.

C. L. McElheney, assistant branch line supervisor of track, at Williamsport, Pa., has been transferred as main line assistant supervisor of track, on the Pittsburgh division with headquarters at Trafford, Pa., to succeed **R. L. Romberger,** resigned. **P. N. Kulick,** junior engineer of track on the Grand Rapids division, has been promoted to assistant branch line supervisor of track on the Williamsport division, succeeding Mr. McElheney. **M. H. McCully,** until recently assistant supervisor at Trafford has been transferred to Cresson, Pa., also on the Pittsburgh division.

Bridge and Building

R. F. Ackerman has been appointed bridge and building inspector, River division, on the New York Central, with headquarters at Weehawken, N.J., to succeed **Warren Grove** who has been appointed assistant superintendent building maintenance at Grand Central Terminal.

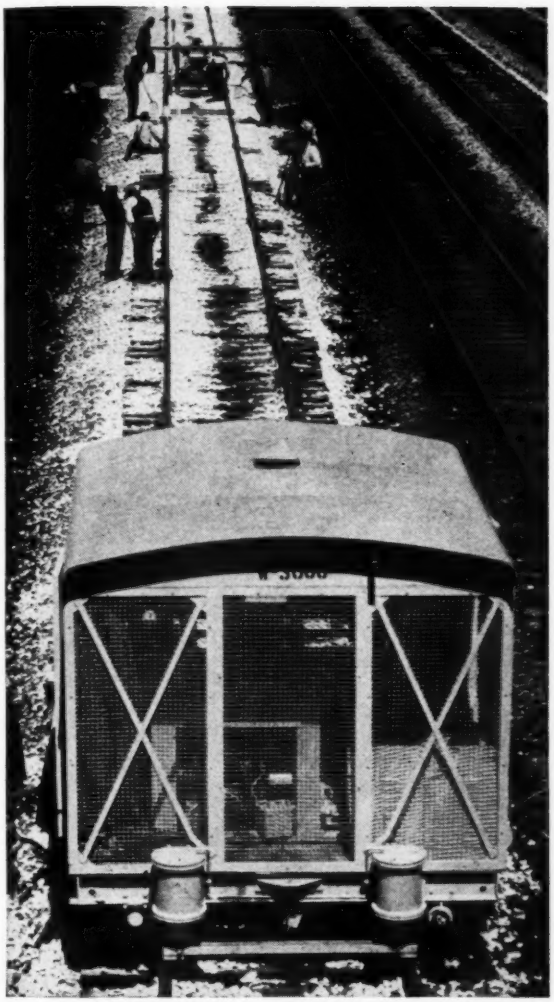
John W. Farr, bridge and building foreman on the Central of Georgia, has been promoted to supervisor of bridges and buildings on the Savannah division, with headquarters at Savannah, Ga., succeeding **R. A. Youngblood,** who has been appointed Terminal supervisor, with headquarters as before at Savannah.

L. C. Cantwell, assistant supervisor of bridges and buildings on the Scioto division of the Norfolk & Western, has been promoted to supervisor of bridges and buildings on that division, with headquarters at Portsmouth, Ohio, succeeding **H. B. McColgan, Jr.,** whose promotion to assistant superintendent of the Scioto division is announced elsewhere in these columns.

R. E. Shamblin has been appointed assistant supervisor of bridges and buildings, Scioto division, with headquarters at Portsmouth, succeeding Mr. Cantwell.

E. B. Jones, assistant to supervisor of bridge erection on the Chesapeake & Ohio at Richmond, Va., has been promoted to supervisor bridges and buildings at Clifton Forge, Va., succeeding **W. A. Hutcheson,** who has been appointed assistant supervisor of bridges and buildings, with the same headquarters. **M. L. Allen,** bridge foreman, system bridge force, with headquarters at Clifton Forge, has been advanced to assistant to supervisor bridge erection at Richmond, succeeding Mr.

(*Continued on page* 836)



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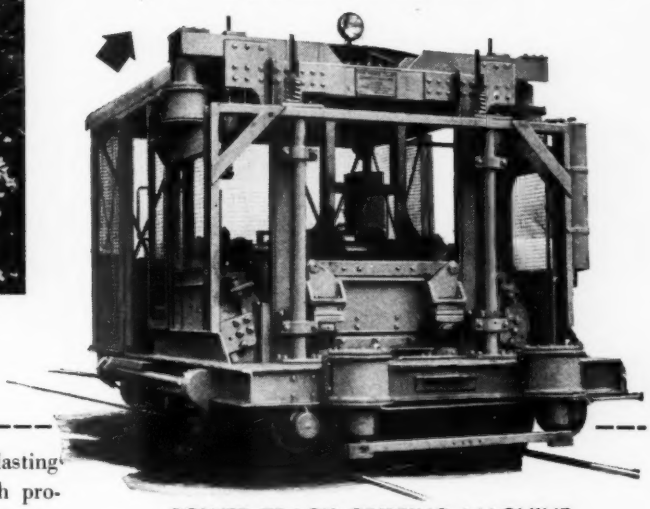

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Railway Personnel (Cont'd)

Jones. **G. A. Allen,** bridge inspector, has been appointed assistant supervisor of bridges and buildings, with headquarters as before at Clifton Forge, to replace **Fred Dodson,** who has been transferred to Covington, Ky. **C. Perry,** system bridge inspector at Richmond, has been appointed assistant supervisor bridges and buildings, with headquarters at Ashland, Ky.

Special

William G. Harding has been appointed architect of the Wabash, with headquarters at St. Louis, Mo., succeeding **R. E. Mohr,** who has retired.

E. O. Wood, chief clerk to the chief engineer maintenance of way of the Western region of the Pennsylvania, with headquarters at Chicago, and formerly a division engineer, retired on July 31.

Walter L. Turner, Jr., associate editor of *Railway Engineering and Maintenance* and Railway Age, with headquarters at Chicago, has been promoted to eastern editor of *Railway Engineering and Maintenance* and eastern engineering editor of Railway Age, with headquarters at New York, and will take up his new duties about September 1. **Norris V. Engman** has been appointed associate editor of *Railway Engineering and Maintenance* and

Walter L. Turner, Jr.

the Railway Age, with headquarters at Chicago.

Mr. Turner was born at Bluefield, W. Va., on January 27, 1913, and was graduated from Virginia Polytechnic Institute in 1935 with the degree of Bachelor of Science in civil engineering. He entered railroad service on April 23, 1936, as a rodman in the construction department of the Central region of the Pennsylvania, and on March 16, 1937, he became an engineer apprentice in the maintenance of way department at Buffalo, N.Y. On January 1, 1938, he was made an assistant on the engineering corps at Wooster, Ohio. On June 1, 1938, he joined the Pennsylvania Turnpike Commission as a party chief, and served in that capacity until February 1, 1939, when he returned to the Pennsylvania as an assistant on the engineering corps on the Eastern division at Alliance, Ohio. On November 16, 1939, he was transferred to Niles, Ohio, and on June 1, 1940, he was transferred to Pittsburgh, Pa. Mr. Turner was appointed assistant supervisor, at Lock Haven, Pa., on October 22, 1940, and served there until March 28, 1941, when he entered the armed forces, from which he was discharged with the rank of major. On December 1, 1945, he returned to the Pennsylvania as assistant supervisor at Freedom, Pa., where he remained until April 23, 1946, when he resigned to become associate editor of *Railway Engineering and Maintenance* and the Railway Age.

Mr. Engman was born at Aberdeen, S.D., on June 1, 1911, and was graduated from the Rose Polytechnic Institute in 1933 with a Bachelor of Science degree in civil engineering. In 1934 he entered the service of the Chicago, Milwaukee, St. Paul & Pacific as a rodman in the engineering department at Chicago. From 1935 to 1943 he served successively as instrumentman, assistant roadmaster and assistant trainmaster at various locations. In June, 1943, he was appointed assistant engineer in the chief engineer's office at Chicago, serving in this capacity until

Norris V. Engman

January 5, 1948, when he joined the editorial staff of *Railway Engineering and Maintenance* and the Railway Age.

Obituary

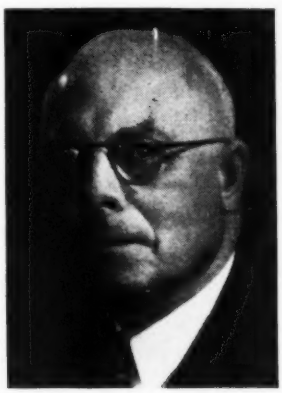
F. B. Giffin, roadmaster on the Canadian National at Brockville, Ont., died recently. He was 67 years old.

Charles H. Morse, assistant engineer maintenance of way of the New York Central system at New York, died on June 30 on a train en route to his home in Yonkers, N.Y., at the age of 62.

J. R. Derrick, manager of roadway maintenance of the Norfolk & Western, with headquarters at Roanoke, Va., died at Roanoke on June 28. Mr. Derrick was born at Paces, Va., on March 15, 1885, and entered the service of the N. & W. as a chainman in the engineering department on March 19, 1906, later serving as rodman and inspector. He became a transitman in 1910, and in 1914 became assistant resident engineer at Bluefield, W. Va. In 1917, he was appointed assistant roadmaster on the Shenandoah division and in 1919 he was promoted to roadmaster on this division, with headquarters at Buena Vista, Va., where he remained until January, 1920, when he was appointed assistant trainmaster of the Pocahontas division. Mr. Derrick was promoted to assistant superintendent of the Radford division, with headquarters at Roanoke, in February, 1925, and later served in this capacity on the Pocahontas division, at Bluefield, until January, 1936, when he returned to Roanoke as assistant to the general manager. In February 1941, he became manager of roadway maintenance, the position he held at the time of his death.

Obituary—Special

Roy V. Wright, vice-president and secretary of the Simmons-Boardman Publishing Corporation, publishers of *Railway*



Roy V. Wright

Engineering and Maintenance and other railway and business periodicals, died on July 9 at East Orange General Hospital, East Orange, N.J., after a brief illness. Mr. Wright was born on October 8, 1876, at Red Wing, Minn., and was graduated from the University of Minnesota in 1898 as a mechanical engineer. In 1931 Stevens Institute of Technology awarded him the honorary degree of Doctor of Engineering. Mr. Wright entered railroad service in July, 1898, as a machinist apprentice on the Chicago, Milwaukee, St. Paul & Pacific at Minneapolis, Minn., and from November, 1899, to 1901, served successively as special apprentice, draftsman and chief draftsman on the Chicago Great Western at St. Paul. In March, 1901, he was appointed mechanical engineer on the Pittsburgh & Lake Erie, which position he held until July, 1904, when he became associate editor of American Engineer and Railroad Journal. In October, 1905, he became editor of that publication, and in March, 1910, he went with the Railway Age Gazette (now Railway Age) as mechanical department editor. He subsequently was appointed editor of Railway Mechanical Engineer and managing editor of Railway Age, which positions he held until his death. Since 1912 he had also served as editor of the Locomotive Cyclopedia and the Car Builders' Cyclopedia. He was editor, also, of the Material Handling Cyclopedia published in 1921.

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Association News

Bridge and Building Association

All technical reports are in hand for presentation at the annual meeting of the association in Chicago, September 20-22, and a strong and interesting program has been completed for that meeting, which will include several important papers and addresses, in addition to committee reports. The program, which will be printed in full in the September issue of *Maintenance*, will also include an inspection trip on the last day of the meeting, and will provide an opportunity for members to see the elaborate Railroad Fair now under way at Chicago, if the Fair remains open through September, as now expected.

National Railway Appliances Association

At a meeting of the Board of Directors of the association on June 30, Lewis Thomas, general sales manager of the Q. & C. Company, and secretary of the Track Supply Association, was appointed assistant secretary of the N.R.A.A., and the permanent address of the association's offices was moved to Mr. Thomas' office at 59 E. Van Buren street, Chicago.

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Meetings and Conventions

American Railway Bridge and Building Association—Annual meeting, September 20-22, 1948, Hotel Stevens, Chicago. Elise LaChance, secretary, 431 S. Dearborn street, Chicago 5.

American Railway Engineering Association—Annual Meeting, March 15-17, 1949, Chicago. W. S. Lacher, secretary, 59 E. Van Buren street, Chicago 5.

American Wood-Preservers' Association—Annual Convention April 26-28, 1949, St. Louis, Mo. H. L. Dawson, secretary-treasurer, 1429 Eye street, N.W., Washington 5, D.C.

Bridge and Building Supply Men's Association—Joint exhibit with Track Supply Association, September 20-22, 1948, Hotel Stevens, Chicago, during concurrent conventions of American Railway Bridge and Building Association and Roadmasters' Association. E. C. Gunther, secretary, 122 S. Michigan avenue, Chicago 3.

Maintenance of Way Club of Chicago—Next meeting, October 25, 1948. Headquarters 105 W. Adams street, Chicago 3.

Metropolitan Maintenance of Way Club—John S. Vreeland, secretary, 30 Church street, New York.

Railway Tie Association—Annual meeting, August 30-September 1, 1948, Greenbriar Hotel, White Sulphur Springs, W. Va. Roy M. Edmonds, secretary-treasurer, 610 Shell Building, St. Louis 3, Mo.

National Railway Appliance Association—Annual exhibit, Chicago, March 14-17, 1949, in connection with the A.R.E.A. convention. R. B. Fisher, secretary, 1 No. LaSalle street, Chicago 4.

Roadmasters' and Maintenance of Way Association of America—Annual meeting, September 20-22, 1948, Hotel Stevens, Chicago. Elise LaChance, secretary, 431 S. Dearborn street, Chicago 5.

Track Supply Association—Joint exhibit with Bridge and Building Supply Men's Association, September 20-22, 1948, Hotel Stevens, Chicago, during concurrent conventions of Roadmasters' Association and American Railway Bridge and Building Association. Lewis Thomas, secretary, 59 E. Van Buren street, Chicago 5.

ADDITIONAL INFORMATION

On Any of the Products Mentioned in This Issue

Below is a complete index of the products referred to in both the editorial and advertising pages of this issue. If you desire additional information on any of them, use one of the accompanying addressed and stamped postcards in requesting it. In each case give name of product and page number. The information will come to you directly from the manufacturer involved, without any obligation on your part.

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M

Magnetos 785
Magnets 844, 851
Material Handling Equipment 848, 853
Metal Saws 812, 849
Metal Siding 794
Mobile Cranes 851, 856
Motor Car Accessories 798
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Oil Spray Cars 798
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Wrenches 766, 797, 798

RAILWAY ENGINEERING AND MAINTENANCE

August, 1948

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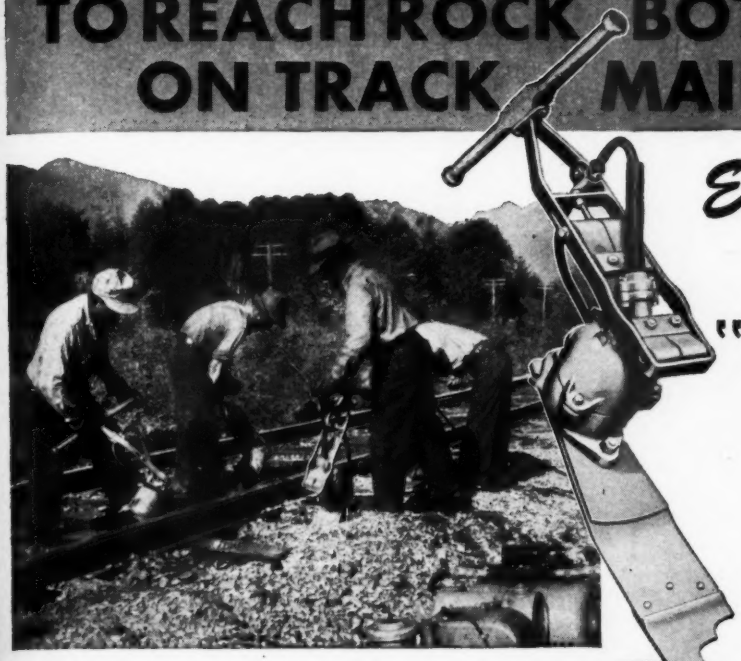
TO REACH ROCK BOTTOM COSTS ON TRACK MAINTENANCE



Equip Your SECTION GANGS *with* JACKSON "LO" TIE TAMPERS

For spot tamping, skeletonizing and such regular out-of-face or surfacing work as section gangs do on many roads, no other equipment equals the productivity and quality of work obtained with Jackson "LO" tampers and power plants. On this type of operation they will bring your costs down to the very minimum!

Use the JACKSON MULTIPLE M T TAMPER *for* MAJOR BALLASTING OPERATIONS

This machine is revolutionizing track ballasting methods from the standpoint of low costs, permanence and absolute uniformity of track. No follow-up or smoothing is necessary, and "the track stays put!" Equally efficient in rock ballast, gravel and light ballast. ONE man operates 12 tampers simultaneously. When working in tandem, two Jackson M-Ts will usually double the daily footage of surfacing gangs without materially increasing the number of men ahead of the machines; and there are just 2 tamper operators instead of 24!

IT'S A "WORLD-BEATER" COMBINATION

ELECTRIC TAMPER & EQUIPMENT CO., Ludington, Michigan

For Maintenance Savings . . .

STOP RUST

with

RUST-OLEUM

It's the Scientific Rust Preventive that Checks Rust by Water, Brine, Smoke, Heat, Weather, Uremic Acid, Etc.

Here's How RUST-OLEUM Saves Labor and Money

Less Preparation Time

- No sandblasting, flame cleaning or chemical dissolvers are necessary. Merely wirebrush to remove rust scale, dirt, etc.

Rust-Oleum Goes on Faster

- It saves 25% on application time and covers 30% more area per gallon. Excellent coverage, gallons of economy.

Enduring Protection

- Rust-Oleum outlasts ordinary materials two to ten times on most jobs, depending on conditions, under which it's used.

Rust-Oleum Rust Preventives can help you to achieve greater net profits by a considerable reduction in the cost of maintenance of all rustable metal surfaces. Indoors or out—*wherever rust threatens*—Rust-Oleum cuts losses from rust. IT CAN BE APPLIED DIRECTLY OVER RUSTING METAL — by brush, dip or spray. It's tough, elastic, weatherproof!

The use of Rust-Oleum adds extra years of service to rolling stock, bridges, metal buildings, right-of-way structures, signal equipment, tanks, towers, etc. Rust-Oleum provides lasting protection for an average of ½ cent a square foot per coat material cost.

Get the facts NOW. Write today for Catalog No. 145.

EASY TO USE
LASTING SATISFACTION
APPLY BY BRUSH, DIP OR SPRAY

RUST-OLEUM CORPORATION

2417 Oakton Street Evanston, Illinois

Association News (Cont'd)

Roadmasters' Association

The Executive committee of the association met in Chicago on July 12, in company with a number of the chairmen of the association's various technical committees, to perfect plans for the convention to be held in Chicago, September 20-22, concurrent with the annual meeting of the American Railway Bridge and Building Association. The two principal items of business at the meeting were to review preliminary drafts of all committee reports and to approve the over-all program for the convention. The complete program for the convention will appear in the September issue. This will include a number of technical addresses and papers in addition to the usual committee reports, and an inspection trip on the afternoon of the 22nd. The program will also afford time for members to see the outstanding Railroad Fair which opened at Chicago on July 20, if the Fair continues open through September, which is now expected.

Track Supply Association; B.&B. Supply Men's Association

According to Director of Exhibits Lewis Thomas, representing both of these associations, 87 firms have already contracted for 156 booths in the joint exhibit of these associations to be held at the Hotel Stevens, Chicago, September 20-22, in conjunction with the concurrent annual meetings of the Roadmasters and Bridge and Building Associations. With some exhibit space still available, companies that desire to take part in the exhibit should address Mr. Thomas, 59 E. Van Buren street, Chicago.

Among the exhibitors are six companies that have not heretofore participated in this exhibit. Since the list of exhibitors was published in the July issue, two additional companies have signed up for space. These are as follows:

American Structural Products Company; subsidiary of Owens-Illinois Glass Company, Toledo, Ohio.

Gravely Ia-Nois, Inc., Davenport, Iowa.

The exhibit hall will be open to visitors in accordance with the following schedule: Monday, September 20—9 a.m. to 6 p.m.; September 21—9 a.m. to 5:30 p.m.; and September 22—9 a.m. to 6 p.m.

In accordance with past practice the two supply associations will entertain the members of the Roadmasters and Bridge and Building Associations, and their families at a dinner to be held on September 21, starting at 7 p.m.

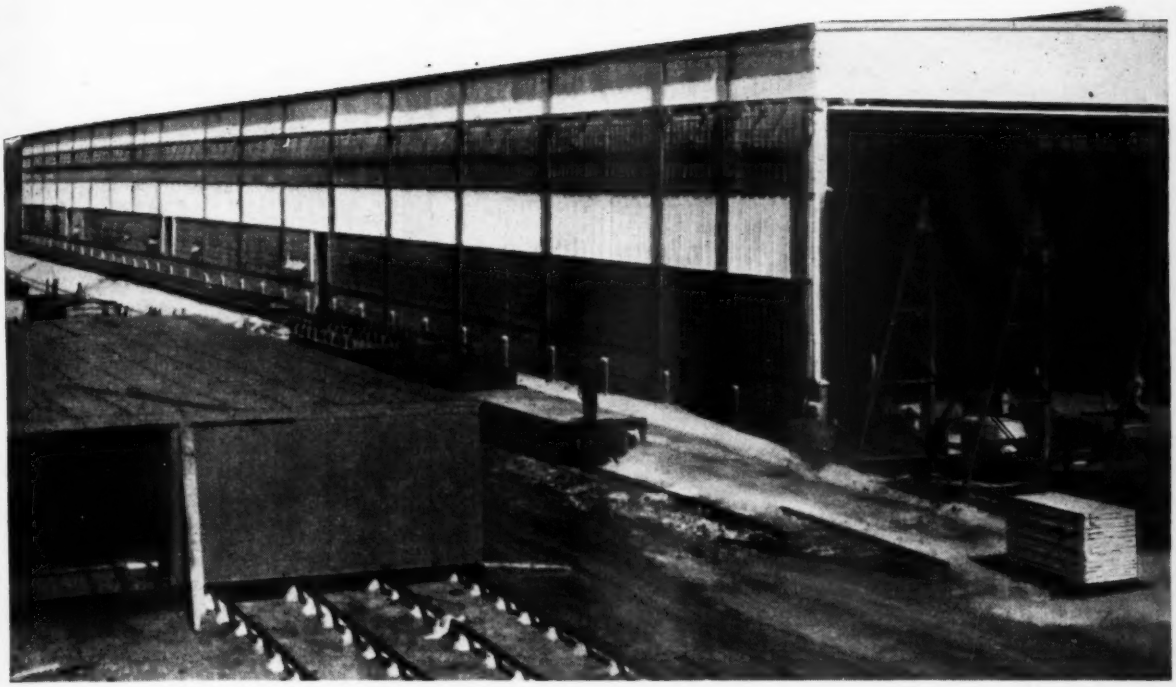
American Railway Engineering Association

The Board of Direction will meet at Chicago on August 17. The principal purpose of this meeting is to consider budget requests of the Engineering division, A.A.R., for the 1949 research program.

In connection with plans for celebrating the semi-centennial year the association is conducting a membership drive which got under way about June 1. Already about 250 applications for membership have been received.

(*Continued on page* 844)

BUILT FOR LOW MAINTENANCE!



New Missouri Pacific car shop has side walls of J-M CORRUGATED TRANSITE*

LONG TERM ECONOMY and low installation costs impelled the Missouri Pacific Railroad to choose J-M Corrugated Transite for the side walls of its new car shop at De Soto, Missouri.

The prime causes of high maintenance—rot, rust, weather, fumes and sparks—are powerless against Corrugated Transite. Moreover, it needs no paint or other preservative treatment.

Fabricated in large sheets, Corrugated Transite requires only a minimum of framing—reducing erection expense. Strong and durable, it is, nevertheless, easy to saw and drill . . . is readily fastened to steel or wood.

Transite is made of asbestos and cement, united under tremendous pressure into a material of great toughness and durability . . . corrugated for extra strength. Because of its natural stone-grey color and streamlined simplicity, Transite is particularly adapted to buildings of modern design.

For more information about J-M Corrugated Transite, address Johns-Manville, Box 290, New York 16, New York.

JOHNS-MANVILLE JM PRODUCTS

*Reg. U. S. Pat. Off.

Johns-Manville 90 YEARS OF SERVICE TO TRANSPORTATION

Where is the safest position for a lifting magnet's weld—

• Operating men who have seen the beating a magnet takes in service know that TOP OF THE MAGNET is the safest place for a weld. *Only new Ohio PROTECTO-WELD Magnets offer you this advantage!*

They're built to withstand harder knocks day in and day out for years. Outer ring and top plate are welded together ON TOP OF THE MAGNET. This protected weld retains its shape, is never dented in. The weld can be turned down for magnet disassembly without cutting away outer ring . . . *without destroying outer pole.*

For extra years of low-cost operation, invest in Ohio PROTECTO-WELD Magnets. They operate cooler . . . lift more uniformly over extended periods of operation . . . last longer. Sizes include 39, 46, 55 and 65-inches diameter. For details, write today to Ohio—*leader in magnetic materials handling.*

Ohio is also a leading name in the small motor industry

Ohio MAGNETS

THE OHIO ELECTRIC MFG. CO.
5916 MAURICE AVE. • CLEVELAND 4, OHIO

Association News (Cont'd)

No meetings of standing committees were held during July and only two have been scheduled for August. The Committee on Iron and Steel Structures will meet at Cleveland, Ohio, on August 4 and 5, and the Committee on Water Service and Sanitation will meet at Chicago, on August 24.

It is expected that the Manual Supplement will be mailed to members about August 1. The proceedings for 1947 are now in the hands of members.

Supply Trade News

General

The **Chapman Chemical Company** has opened new general offices in the Dermon building, Memphis 3, Tenn. Administrative and research activities formerly handled from Chicago and New Orleans, La., will be consolidated in Memphis, where the company has had its plant for many years.

The **American Hoist & Derrick Co.** has announced the appointment of the **Overland Supply Company,** 55 New Montgomery St., San Francisco, Cal., as its exclusive railroad supply agent for the Southern Pacific, the Western Pacific, the Northwestern Pacific, the Oakland Terminal, the Sacramento Northern, the San Diego & Arizona Eastern, the Tidewater Southern and the Pacific Fruit Express Company.

Personal

The **Northwest Engineering Company** has appointed **F. A. Stoughton,** 487 McCully street, Pittsburgh, Pa., district sales manager in the Pittsburgh area.

Harold T. Anderson has been appointed assistant to the general sales manager of the **Worthington Pump & Machinery Corp.,** with headquarters at Harrison, N.J.

D. J. Hedgecock has been appointed engineering specialist in the wire, road, bar and structural division of the **Reynolds Metals Company,** to succeed **T. E. Bowen,** who has resigned.

A. C. Boock, chief engineer for the Springfield, Ill., works of the **Allis-Chalmers Manufacturing Company,** has been appointed general manager of Springfield operations. **F. A. Schick** succeeds Mr. Boock as chief engineer.

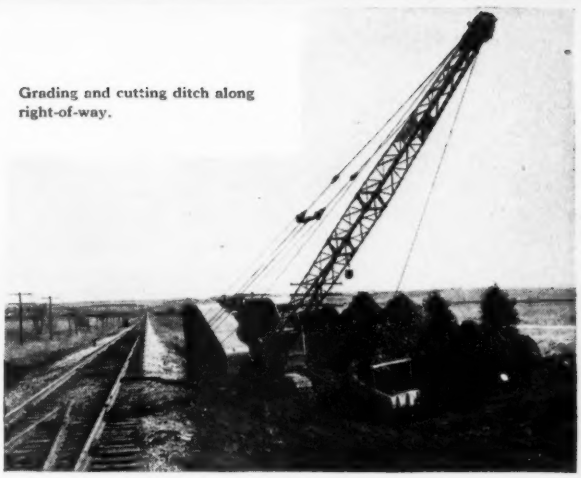
Gilfry Ward, vice-president of the American manganese steel division of the **American Brake Shoe Company** since 1938, also has been appointed vice-president of the firm's Kellogg division. Mr. Ward has been with American Brake Shoe Company since graduating from college in 1928. He will continue to be located in Oakland, Cal.

(*Please turn to page* 846)

LINK-BELT SPEEDER

"OFF THE TRACK" EQUIPMENT
Expedites, Simplifies, Reduces Costs on Maintenance and Construction

The term "off-the-track" makes clear the principal advantage of the crawler type shovel-crane for railway construction and maintenance. The Link-Belt Speeder machines illustrated are all working freely and entirely independent of the rail traffic. It is also obvious, that a crawler or wheel mounted unit can operate at any distance from the rails, as in the



Grading and cutting ditch along right-of-way.

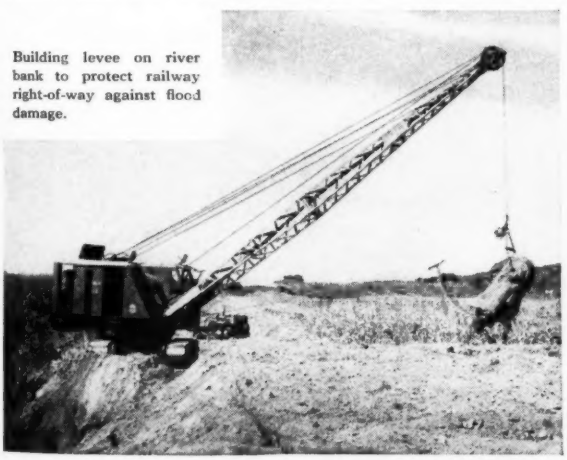
After levelling the road bed with dragline, the Link-Belt Speeder is placing ties and laying rails.

case of a power shovel digging and loading ballast in a quarry, or excavating or building beyond the rails. The machine can be maneuvered into its most advantageous operating position, when it is off the rails.

The Link-Belt Speeder line of Shovel-Cranes ranges in capacity from the 3/8 cubic yard up to the 3 cubic yard size, and each machine can be readily converted to use as shovel, crane, dragline, clamshell, pile driver or trench-hoe. Earth moving operations such as grading or ditching are commonly performed using the dragline bucket, which is also useful in handling sand and gravel in stock piles. The dragline gives the unit its widest area of operation, the power shovel works in a more limited area, but supplies greater digging power, as required in rock cuts, for example. The same boom will permit the use of clamshell or dragline, or hook-block or slings for handling rails, structural steel or other types of material in loading, unloading or construction work.

Half yard dragline replacing fill after construction of bridge.

Building levee on river bank to protect railway right-of-way against flood damage.



There is a Link-Belt Speeder distributor near you, equipped and trained to supply quick, courteous, efficient sales or service on all types of Link-Belt Speeder Machines. Call on him for detailed explanation or demonstration of the broad line of Link-Belt Speeder Shovel-Cranes.

10,980

LINK-BELT SPEEDER

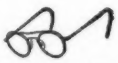
LINK-BELT SPEEDER CORPORATION, CEDAR RAPIDS, IOWA

Builders of the Most Complete Line of
SHOVELS-CRANES-DRAGLINES

Eye Protection Can Feel Good and Look Good

Style BS Metal Frame with saddle bridge and side shields.

These safety spectacles with either metal or plastic frames feel good because they fit any type of face with that "made-to-order" look. Comfortable fit is assured by their light weight and the variety of bridge widths and lens sizes available. They are furnished with or without sideshields, and fitted with WILLSON Super-Tough*, flat or curved lenses for ample protection on many heavy-duty operations.



Style A Metal Frame with rocker nose pads.

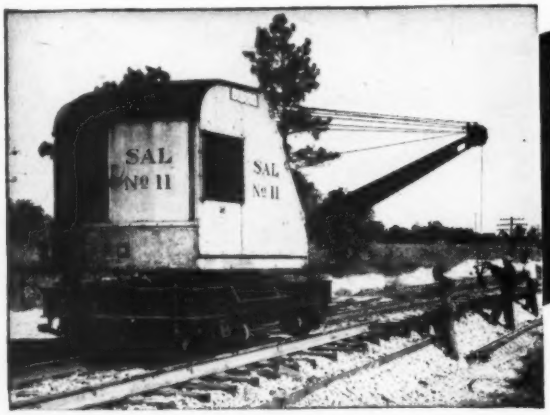
Styles WP and WPS Plastic Frames with and without sideshields.

WILLSON*

For complete information on these products and their application, as well as many more eye and respiratory protective devices, get in touch with your nearest WILLSON distributor or write us direct.

*T. M. Reg. U. S. Pat. Off.

WILLSON PRODUCTS, INC., 243 WASHINGTON ST., READING, PA.



Rail-Road Specialist Only

Burro Cranes Have:

- Fast travel speeds—up to 22 M.P.H.
- Draw Bar Pull of 7500 lbs. (often eliminates need for work train or locomotive).
- Elevated Boom Heels for working over high sided gondolas.
- Short tail swing—will not foul adjoining track.
- Low overall height—Burro can be loaded and worked on a standard flat car.

We call Burro Cranes "Railroad Specialists" because they do so many railroad jobs so well. Track work, bridge work, bulk materials handling, Mechanical Stores Department, material handling with or without magnet, are only a few jobs Burro does with speed and economy.

Burro Cranes are designed for railroad work—not adapted to it. Watch a Burro work and see why it's called on to do so many jobs by most of the country's railroads.

EXHIBITOR BRIDGE & BUILDING TRACK SUPPLY ASSOCIATIONS
HOTEL STEVENS, CHICAGO SEPT. 20-21-22, 1948

Burro WORK Power means more EARNING Power

CULLEN-FRIESTEDT CO.
1301 S. Kilbourn Ave., Chicago 23, Ill.

Supply Trade News (Cont'd)

John J. Lincoln, director of sales services of the **Air Reduction Sales Company,** has been appointed manager of the railroad department, with headquarters in New York. Mr. Lincoln joined Air Reduction in 1924, and in 1934 was made manager of the Pittsburgh, Pa., office. In 1938 he was transferred to New York as regional sales manager. He became director of sales services in 1945.

John J. Lincoln

John G. Little, assistant to vice-president, **Simmons-Boardman Publishing Corporation,** at Cleveland, Ohio, since 1928, retired on June 1. Mr. Little was born in North Chemung, N.Y., on September 14, 1881. He entered railroad service with the Erie in September, 1902, serving successively as trackman, rodman and transitman. From 1903 to 1905 he was assistant engineer at Hornell, N.Y., for the same road. In 1906 he joined the Delaware, Lackawanna & Western as assistant engineer at Binghamton, N.Y., serving in the same capacity at Buffalo, N.Y., from 1908 to 1915. Mr. Little entered the employment of Simmons-Boardman in June, 1916, as eastern engineering editor of the Railway Age Gazette (now Railway Age), and associate editor of *Railway Engineering and Maintenance.* In 1928 he was appointed to the position he held at the time of his retirement.

John G. Little

(*Please turn to page* 848)

There's a better way: use WHITE Switch Heaters

Gangs of men are not needed to keep switches open when WHITE Gas Burning Switch Heaters are used. For 25 years they have proven to be the only snow melters which can effectively cope with maximum storms. There are no clogged switches with WHITE heaters.

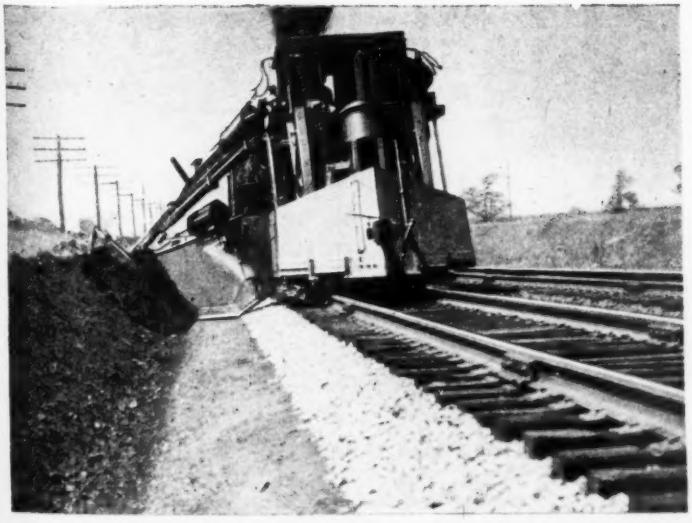
Write for descriptive circulars.

White Manufacturing Company

ELKHART, INDIANA

E. R. Mason, New York; Reade Mfg. Co., Chicago

Fast maintenance for fast traffic - The JORDAN



For keeping roadbed in perfect condition, the husky, versatile JORDAN Spreader-Ditcher has no equal. It shapes ballast, spreads fill, cleans and reshapes ditches to assure the proper drainage essential to handling high speed traffic. It's an incomparable maintenance "crew" — always ready, always efficient, always economical.

To see this versatile machine at work, send for the Jordan Book with its 100 action photographs.

EXHIBITOR
BRIDGE & BUILDING
TRACK SUPPLY
Associations
HOTEL STEVENS, CHICAGO
SEPT. 20-21-22, 1948

O. F. JORDAN COMPANY

WALTER J. RILEY, *President*

EAST CHICAGO, INDIANA

Supply Trade News (Cont'd)

Edwin A. Wert has been appointed vice-president in charge of engineering of the **Ric-wil Company,** Cleveland, Ohio.

Fred C. Foy, vice-president of the **J. Walter Thompson Company,** has accepted an appointment as vice-president and manager of the sales department, central staff, of **Koppers Company,** with headquarters at Pittsburgh, Pa.

Ernest H. Sockwell, sales engineer for the **Railroad Accessories Corporation,** covering the territory of Chicago and west, has been appointed eastern representative for the railroad division of the **Pettibone Mulliken Corporation** and the **George Haiss Company,** with headquarters at 141st street and Canal place, New York 51.

F. E. Rolston has been assigned by the **Dearborn Chemical Company** to the territory previously covered by **Tom Holcombe.** Mr. Rolston will cover Louisiana, Arkansas and part of eastern Texas.

The **General Electric Company** has announced the installation of direct sales and service facilities for G-E arc welders, electrodes and welding accessories at its Fitchburg, Mass., plant. The new service will be under the direction of **Roger W. Wenzel,** sales representative of the Welding Equipment divisions for central and western Massachusetts, and the states of Maine, Vermont and New Hampshire.

● Prevent your tanks from rusting
● Keep your tanks in continuous service (no downtime for painting)
● Cut tank maintenance and servicing costs

With

RUSTA RESTOR

The modern-proved Cathodic (i. e. electrical) method that employs the basic principles of electro plating to keep tanks in a "neutral" condition that prevents rusting.

Used by more than 30 railroads

RUSTA RESTOR not only prevents rusting, but also removes the effects of any earlier rusting. Inexpensive to install—cheap to operate—safe. Write for fully descriptive booklet today.

RUSTA RESTOR
A DIVISION OF
THE JOHNSTON & JENNINGS COMPANY
848 ADDISON ROAD • • • CLEVELAND 14, OHIO

Trade Publications

(To obtain copies of any of the publications mentioned in this column, use postcards, page 839)

Stop Leaks Instantly—This is the title of a six-page folder published by the Stonhard Company to describe its waterproofing compound. The pamphlet, which is printed in two colors, outlines and illustrates the various types of masonry construction, either above or below ground, where Stonhard Stontite can be used to prevent water seepage or seal leaks.

Saw, Tool and File Manual—Henry Disston & Sons, Inc., has published a 64-page illustrated booklet describing its line of saws, files and other tools. The manual tells how to select and use these tools, and how to keep them in good serviceable condition. It also contains numerous pictures showing the tools in operation.

Caterpillar Scrapers—The Caterpillar Tractor Company has recently issued a 16-page booklet entitled, "Caterpillar Scrapers at Work." Printed in two colors and liberally illustrated with action pictures, the bulletin describes various applications and advantages of Caterpillar No. 60, No. 70 and No. 80 scrapers, which have been designed for use with the company's D6, D7 and D8 track-type tractors.

Industrial Pumps—Bulletin No. 4711, describing pumps for abusive service, has recently been released by Nagle Pumps. This 36-page booklet presents recent developments in horizontal and vertical-shaft centrifugal pumps for such applications as pumping corrosive or hot liquids and abrasive or heavily laden mixtures. The bulletin also contains detailed information on priming, and is liberally illustrated with pictures, drawings and charts.

Quick-Setting Sealers—The Sika Chemical Corporation has issued a four-page illustrated folder describing its quick-setting compounds, Sika No. 2 and No. 4A, for sealing pressure leaks in concrete and masonry construction. The pamphlet contains detailed instructions on the use of the compounds, together with pictures showing the sequence of application. It also gives suggested solutions to a number of maintenance problems.

For SAFE Handling

Of Railroad Ties, Bridge Timbers, Pulpwood, Wood Crates, Other Timber Products.

Mack Safety Hand Tongs. Mack Log & Pole Tongs. Mack Pulpwood Grapples

SAFETY HAND TONGS

EXHIBITOR BRIDGE & BUILDING TRACK SUPPLY ASSOCIATIONS
HOTEL STEVENS, CHICAGO SEPT. 20-21-22, 1948

LOG AND POLE TONGS

MACK WELDING CO.
Manufacturers of Material Handling Equipment
MANGANESE FROG AND CROSSOVER RECLAIMING—BRIDGE REPAIRS.
9206 Grand Ave. Place, Duluth 8, Minn.
Distributors in Principal Cities, U.S. and Canada.

on the Job with

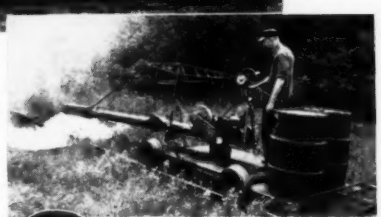
WISCONSIN POWERED

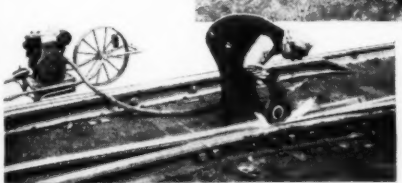
Maintenance Equipment!

Typical of the many and varied railway maintenance operations that are now most advantageously handled by Wisconsin Engine-powered equipment, are those illustrated below. It is a noteworthy fact that these manufacturers specify "Wisconsin Heavy-Duty Air-Cooled Engines" as standard power for the operation of their equipment . . . a well-founded tribute to the extreme dependability, all-weather serviceability, economy, operating efficiency and adaptability of Wisconsin Air-Cooled Engines.

Spraying rail joints with Wisconsin-powered Fairmont W61 Series A Oil Spray Car, made by Fairmont Railway Motors, Inc., Fairmont, Minn.

Woolery Jr. Weed Burner, made by Woolery Machine Co., Minneapolis, Minn., engaged in clearing track of heavy weed growth.





Frog grinding with Model P-22 Portable Flexible Shaft Grinder, for steam railroad use, made by Railway Track Work Co., Philadelphia, Pa.

Tie tamping with Wisconsin-powered tamping outfit made by Electric Tamper & Equipment Co., Ludington, Mich.

Northwestern 540-DA double head type Rail and Frog Grinder, made by Northwestern Motor Co., Eau Claire, Wis., grinds either rail or both rails of frogs or cross-overs without turning machine around.

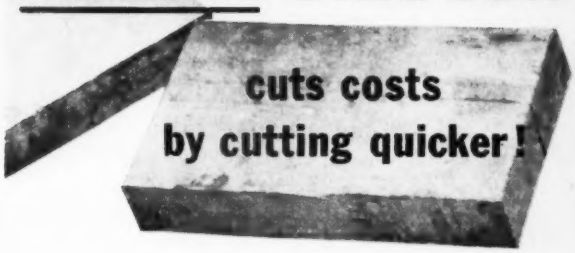
Wisconsin Heavy-Duty Air-Cooled Engines are supplied in a complete power range from 2 to 30 hp., in 4-cycle single cylinder and 4-cylinder types.

WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines

MILWAUKEE 14 WISCONSIN

Pneumatic SKIL Saw



Pneumatic SKIL Saw cuts your BIG jobs down to size *fast!* It saves time maintaining the right of way, speeds bridge building, steps up all sawing in construction. Cuts up to 4⅜ inches deep in wood . . . saws 8 x 12's in two easy strokes. Big 12-inch blade drives quickly through wood, metal, stone, concrete and compositions on 80 to 100 pounds of air. Heavy duty rotary motor, ball bearing construction, die-cast aluminum body make *Pneumatic* SKIL Saw easy to handle, easy to maintain . . . the *right* saw for *tough* jobs! Ask your SKIL Tool Distributor for a demonstration *today!*

SKILSAW, INC.

5033 Elston Avenue, Chicago 30, Ill.

Factory Branches in Principal Cities

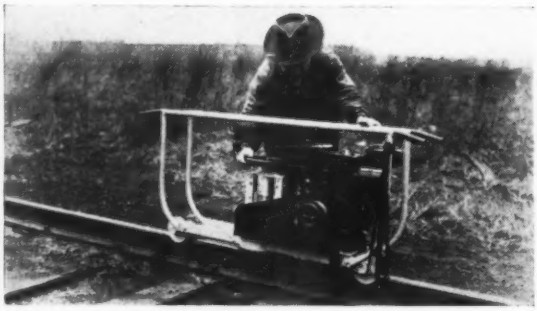
In Canada: SKILTOOLS, LTD., 66 Portland St., Toronto, Ont.

SKIL ELECTRIC **Tools** PNEUMATIC

TRADE-MARK

Increases

RAIL GRINDING ACCURACY



NEW *P-45*

PORTABLE RAIL SURFACE GRINDER

This new, one-man cup wheel machine grinds welded rail ends and removes mill tolerance and scale before heat treating. With a high degree of accuracy at a minimum of operator's skill and effort . . . gives a smooth, highly polished surface. Portability and light weight make it ideal for heavy traffic lines.

Check these advantages!

- **3½ H.P. air-cooled gasoline engine.**
- **Adjustable V-Belt Drive acts as overload release, preventing damage to other moving parts.**
- **Cup Wheel is adjustable to compensate for wear.**
- **Ball bearings and wearing parts are protected against dust and dirt.**
- **Rollers on carriage guide are adjustable—assure proper cutting angle of grinding wheel.**
- **Length, 58 inches—Width, 14½ inches—Height, 25½ inches—Weight, 225 lbs.**

● ***Write*** **for more information on the P-45 and other fast, easy-to-operate track equipment.**

4382

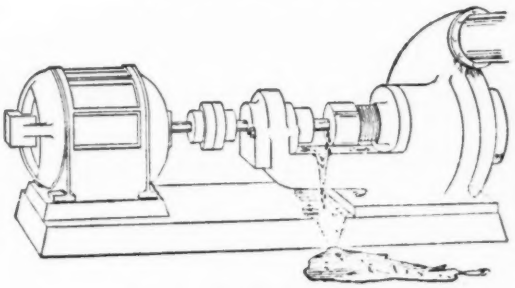
Railway Track-work Co.

3207 KENSINGTON AVE., PHILADELPHIA 34, PA.

AGENTS FOR

Kershaw-Railway Maintenance Equipment and Mark-Rite Paint Marker

TROUBLED WITH LEAKY BOXES STUFFING on Your Pumps?



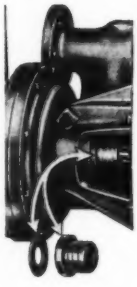
SYNTRON

"Replacement"

SHAFT SEALS

Eliminate

Leakage and Repacking Nuisance



Self-lubricating "Packaged" units—no conglomeration of parts to fuss with—easy to install. Just slide over shaft and secure.

Standard seals for handling clean water, refrigerant gases, oils and other petroleum products — in temperatures from —10° F. to +200° F. — and pressures up to 250 p.s.i.

Special seals for corrosive and abrasive liquids.

Built-in flexibility eliminates wear from shaft misalignment, shudder or vibration.

Also available as propeller shaft seals and bulkhead shaft seals for power boats, tugs, river and ocean-going vessels.

Available for shafts from 1/4" up to 24" dia.

Illustrated folder available on request

SYNTRON CO.

290 Lexington — Homer City, Pa.

A Hole... a Minute!

with the

NEW Mall
REG. U.S. PAT. OFF.

Rail Drill Attachment

POWERED BY MALL

GASOLINE ENGINE RAIL UNIT

Here's a new Mall Attachment that converts your Mall Rail Grinder Power Unit into a fast and accurate Rail Drill. Every feature of this Mall Rail Drill is adapted to the drilling needs of the right-of-way. It has the power to put 1-1/16" holes through 100 or 112 pound rails in less than a minute . . . it is light in weight so that it can be carried from place to place . . . it is easily removed for passing trains . . . and it is short in length to allow convenient use on narrow switch sections. It can also be used for drilling "I" beams and girder rails.

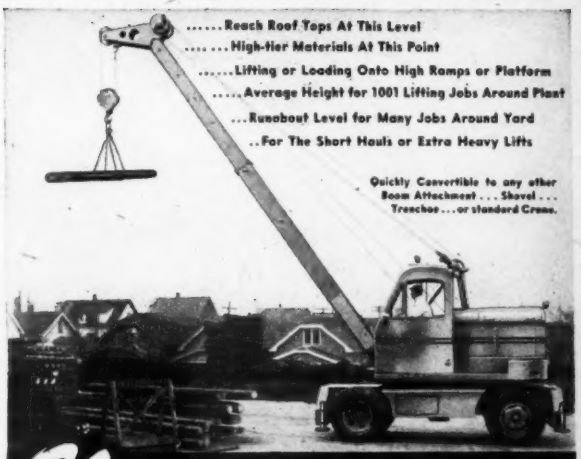
The Mall Rail Drill is one of many attachments for track maintenance that operate from the Mall Rail Grinder—a 6 H.P. Gasoline Engine Power Unit with a wheel barrow mounting for on or off the track use.

New 1948 Catalog of Mall Portable Power Tools will be mailed upon request.

EXHIBITOR BRIDGE & BUILDING TRACK SUPPLY ASSOCIATIONS
HOTEL STEVENS, CHICAGO SEPT. 20-21-22, 1948

Railroad Department
MALL TOOL COMPANY
7746 South Chicago Ave., Chicago 19, Ill.
MALL REPRESENTATIVES: Allied Tools & Supply Co., Louisville; John N. Thorp Co., New York; Hubbell & Co., St. Louis; D. N. Carlin & Co., Pittsburgh; R. W. Hudgins & Son, Norfolk.

Mall REG. U.S. PAT. OFF. **PORTABLE POWER TOOLS**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.....High-tier Materials At This Point
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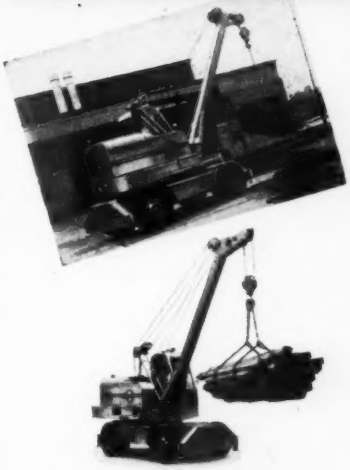
.....Average Height for 1001 Lifting Jobs Around Plant
...Runabout Level for Many Jobs Around Yard
..For The Short Hauls or Extra Heavy Lifts
Quickly Convertible to any other Boom Attachment . . . Shovel . . . Trenchoe . . . or standard Crane.

Now...the UNIT *357*
MOBILE CRANE with a *TELESCOPIC BOOM*
6 BOOM POINT LEVELS IN 1



- It Travels on its Own Power
- It Rides on Rubber
- It Goes Anywhere
- It Lifts Anything
- It Has 1001 Uses

This Unit Telescopic Boom broadens the scope of your Unit Crane. The boom is easy to adjust. It can be extended from a minimum of 16 feet to a full length of 26 feet, in progressive steps of 2 feet each. Merely remove 4 bolts, set boom at any desired height, replace bolts and the machine is ready for action. It lifts—loads—and hauls from any point to any place in or out of plant. Gas or Diesel power. Write for literature.

- A WORKING LEVEL FOR MANY JOBS IN YOUR PLANT
- IT WILL NEVER BE IDLE . . . DAY AFTER DAY
- HANDLES . . . LUMBER, MACHINERY, CASTINGS, STEEL, SKIDS . . . WITH EASE

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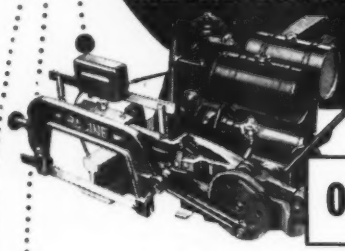
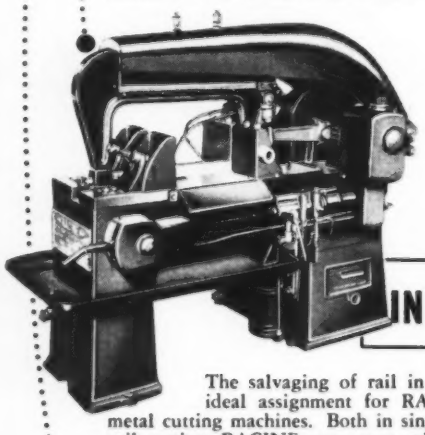
For High Speed RAIL CROPPING

USE RACINE METAL CUTTING SAWS



ON TRACK

The RACINE Portable Rail Cutter is light, yet fast and accurate. Designed especially for road use, it can be lifted and moved by two men, thus speeding the job and preventing traffic delays which might be caused by heavier on-track equipment. The RACINE Rail Cutter is compact, individually powered, sturdy. In operation, it is a one-man tool, providing smooth rail cropping. The finished cuts are without thermal cracks that often lead to rail failure.



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The salvaging of rail in the yards is an ideal assignment for RACINE hydraulic metal cutting machines. Both in single and multiple rail cutting, RACINE saws crop split, worn or battered ends quickly and cleanly. RACINE machines, in capacities from 6" x 6" to 20" x 20", are hydraulically operated and controlled. They are simple in design and operation, rugged in construction, low on maintenance cost.

Ask for RACINE Catalog No. 12 and Bulletin 706A. Address RACINE TOOL AND MACHINE COMPANY, 1738 STATE ST,. RACINE, WISC.

RACINE

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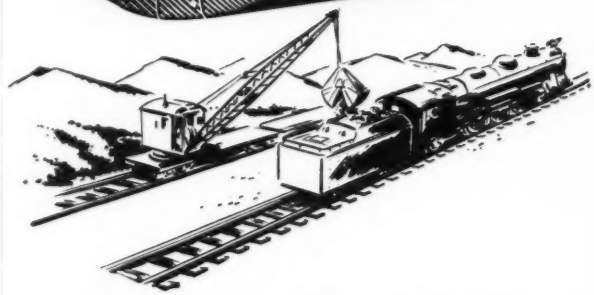


BUSY BUCKETS

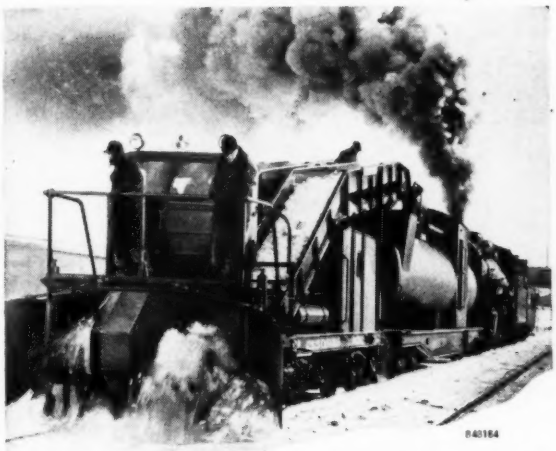
For the railroads Blaw-Knox builds buckets that are kept busy on many jobs . . . fueling engines, rehandling from stock piles, ash pit service, ballast rehandling, barge clean-up, etc. For a quick appraisal of Blaw-Knox Buckets widely used for railroad work, write for Bulletin 1989.

BLAW-KNOX DIVISION
of Blaw-Knox Company
2054 Farmers Bank Bldg.
Pittsburgh 22, Pa.

You can select *the bucket you need* from this catalog.

BLAW-KNOX BUCKETS

Keep yards open— trains moving



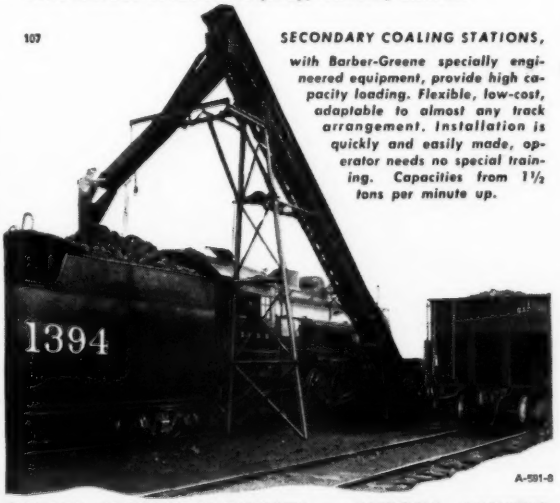
040184

• Barber-Greene Railroad Snow Loader-Melter

New York . . . Milwaukee . . . Toronto . . . Chicago . . . where will massed drifts jam yards, clog rail centers next winter? Wherever blizzards and heavy snow may strike, railroads whose yards are equipped with the Barber-Greene Snow Loader-Melter can be sure that their yards will be cleaned faster, more effectively and at greatly reduced cost. This team has reduced snow removal costs for some roads as much as $6,000.00 per day over hand methods . . . and saved much more than that in schedules maintained.

This Barber-Greene unit consists of a BG-568 Snow Loader, a Melter Tank, with a capacity of 12,000 gallons, and the Heating Tank of 4,000 gallons capacity. Tanks are heated by direct injection of steam from the locomotive which pushes the unit. For additional information, see your Barber-Greene distributor or write Barber-Greene Company, Aurora, Illinois.

107



A-591-B

SECONDARY COALING STATIONS, with Barber-Greene specially engineered equipment, provide high capacity loading. Flexible, low-cost, adaptable to almost any track arrangement. Installation is quickly and easily made, operator needs no special training. Capacities from 1½ tons per minute up.

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Barber-Greene

Serving Our Biggest *STEEL MILLS*

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For catalogs, bulletins or specific information on the subject of Well Water Systems, address

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General Offices
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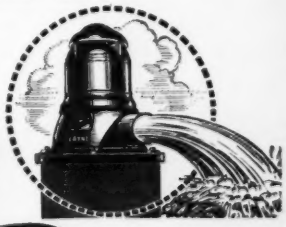

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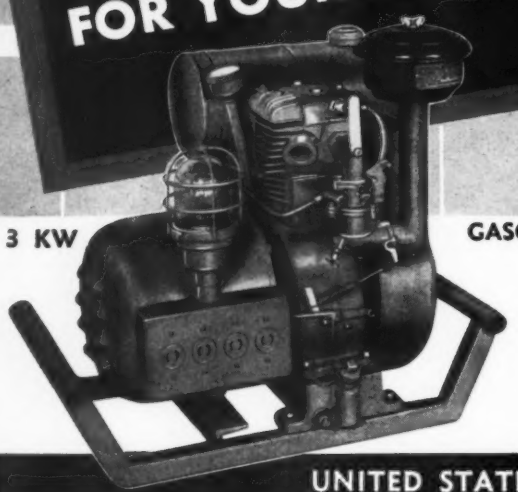
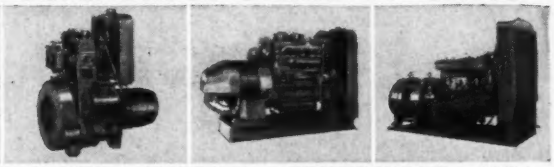


3 KW

COMPACT PORTABLE UNITS

DEPENDABLE STAND-BY UNITS



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the improved GAUTIER rail anchor

it can't be overdriven...

The Improved Gautier is a 1-piece rail anchor that can be applied with a spike maul. It is scientifically designed so that it cannot be overdriven. Large bend radii prevent localized stresses and distribute the load over a substantial rail area. Write for complete information.

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Q AND C CAR STOPS

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EXHIBITOR — BRIDGE & BUILDING TRACK SUPPLY ASSOCIATION — HOTEL STEVENS, CHICAGO SEPT. 20-21-22, 1948

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Chicago 5 New York 6 St. Louis 1

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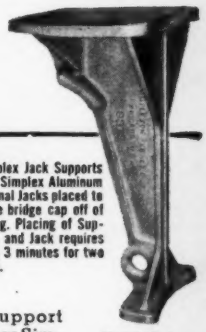
Simplex Jack Supports and Simplex Aluminum Journal Jacks placed to raise bridge cap off of piling. Placing of Support and Jack requires only 3 minutes for two men.



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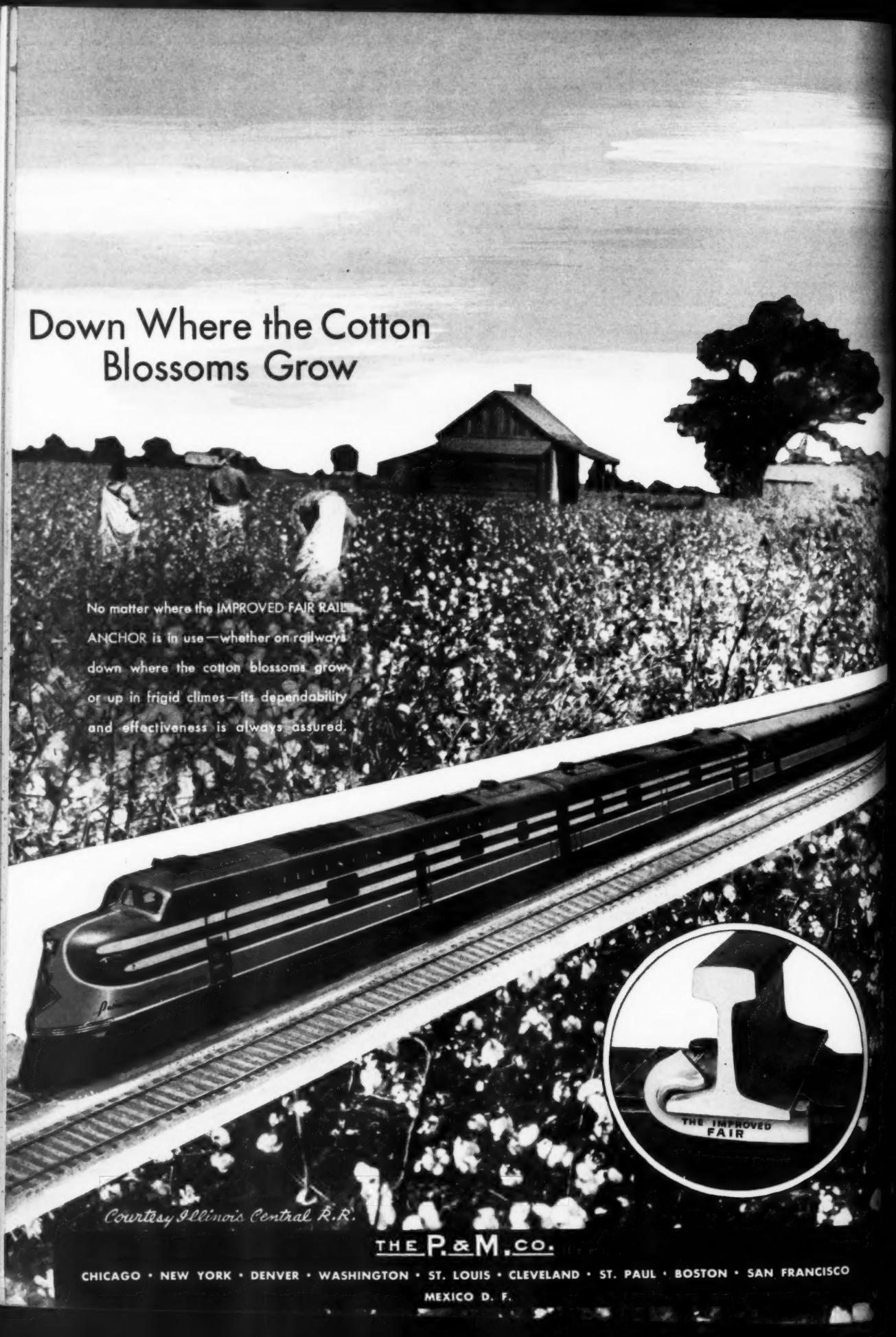
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